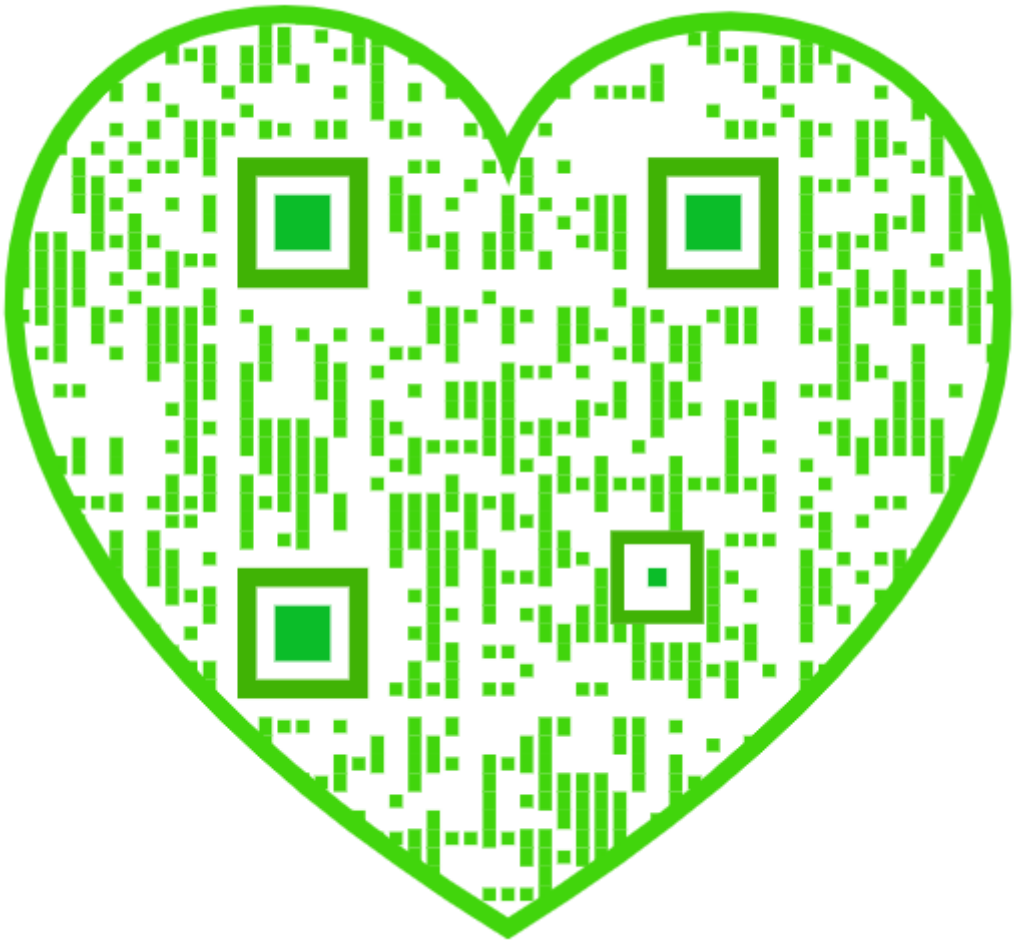


QK150
.H295

Norman Taylor Collection

compliments of the author

GEOLOGICAL SURVEY OF ALABAMA
EUGENE ALLEN SMITH, State Geologist

MONOGRAPH 8

ECONOMIC BOTANY OF ALABAMA

PART 1

GEOGRAPHICAL REPORT

ON FORESTS

1913

GEOLOGICAL SURVEY OF ALABAMA

EUGENE ALLEN SMITH, STATE GEOLOGIST

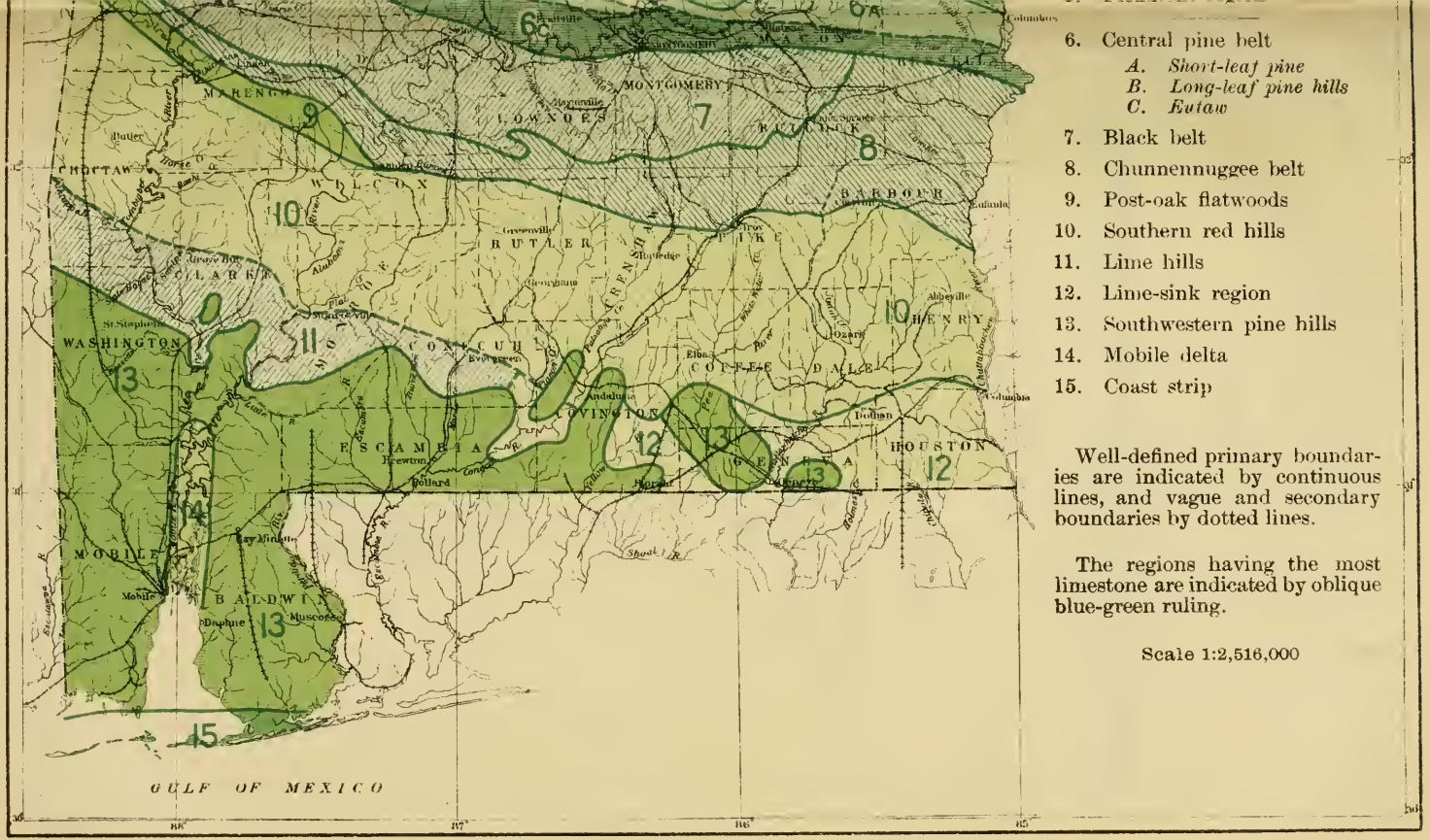
MAP OF ALABAMA SHOWING GEOGRAPHICAL DIVISIONS OR FOREST REGIONS

ROLAND M. HARPER

1913

REGIONS

1. Tennessee valley
   - *A. Barrens*
   - *B. Valley proper*
2. Coal region
   - *A. Plateau*
   - *B. Basin*
3. Coosa valley



6. Central pine belt
   - *A. Short-leaf pine*
   - *B. Long-leaf pine hills*
   - *C. Eutaw*
7. Black belt
8. Chunnennuggee belt
9. Post-oak flatwoods
10. Southern red hills
11. Lime hills
12. Lime-sink region
13. Southwestern pine hills
14. Mobile delta
15. Coast strip

Well-defined primary boundaries are indicated by continuous lines, and vague and secondary boundaries by dotted lines.

The regions having the most limestone are indicated by oblique blue-green ruling.

Scale 1:2,516,000

GEOLOGICAL SURVEY OF ALABAMA
EUGENE ALLEN SMITH, *State Geologist*

MONOGRAPH 8

Economic Botany of Alabama

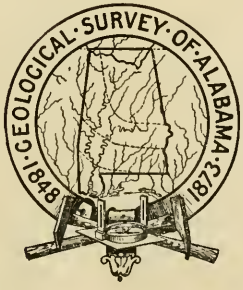
PART 1.

GEOGRAPHICAL REPORT

Including Descriptions of the Natural Divisions of the State, their Forests and Forest Industries, with Quantitative Analyses and Statistical Tables.

By

ROLAND M. HARPER



UNIVERSITY, ALABAMA
JUNE, 1913

QK 130
.A1295

PRESS
BROWN PRINTING CO.
MONTGOMERY
ALABAMA

LETTER OF TRANSMITTAL.

To His Excellency,
Governor Emmet O'Neal,
Montgomery, Ala.

Dear Sir:—I have the honor to transmit herewith Part I of a report on the Economic Botany of Alabama, by Dr. Roland M. Harper.

The plan of the present Geological Survey, organized in 1873, embraced the investigation of all the natural resources of the State, geological, agricultural, botanical, etc. The great work of Dr. Charles Mohr on the Plant Life of Alabama, published in 1901, was the first of the botanical series, and it was planned to supplement this systematic catalogue of our native plants with reports on their economic aspects. Dr. Mohr died before this part of the work could be taken up by him.

Dr. Harper, the author of this report, has been in the South most of the time since 1887, and in the last ten years has studied the forest conditions in all the southeastern states, particularly Georgia, Florida and Alabama, having been employed on Geological Surveys of each of these three states. His work in Alabama, beginning in 1905, has covered something over two years all told, and has extended over practically all parts of the State. Since 1908 he has revisited about half of the counties and has taken over three hundred photographs of Alabama scenery, without cost to the Survey. Forty-eight of these photographs, together with some older ones belonging to the Survey collection, are used to illustrate the present report, and many others, together with a great mass of field notes already in hand, will be available for future reports.

Part I of the Economic Botany of the State, now submitted, is a geographical report on the forests and forest industries of each of the natural divisions of the State, together with quantitative analyses of the forests of each region, something, so far as we know, not before attempted for a whole state.

This forms the natural introduction to the other botanical reports which are planned to follow, viz: Part II, a catalogue of the trees and shrubs, with their distribution and economic properties; Part III, the medicinal plants, the weeds and other useful or noxious plants not included in the preceding parts.

Very respectfully,

Eugene A. Smith.

University of Alabama,
March 26, 1913.

GEOLOGICAL SURVEY CORPS, 1913.

Eugene Allen Smith, Ph. D., LL. D.----------State Geologist
William F. Prouty, Ph. D----------Chief Assistant
Robert S. Hodges----------Chemist
Herbert H. Smith----------Curator of Museum
Mrs. Herbert H. Smith----------Voluntary Assistant Curator
Roland M. Harper, Ph. D.----------Botanist
George N. Brewer----------Field Assistant
C. A. Abele----Clerk in charge of Statistics of Mineral Production
James A. Anderson----------Clerk in charge of Mailing List
A. T. Donoho----------Stenographer

RIVER GAUGE HEIGHT OBSERVERS.

C. J. Stowe----------Jackson's Gap, Tallapoosa River
J. E. Whitehead----------Riverside, Coosa River
Lomax Estes----------Epes, Tombigbee River
W. G. Early----------Pera, Pea River
S. T. Dillard----------Beck, Conecuh River

From the records of daily observations of the gauge readings at these places when extended through sufficient time, the calculations of available horsepower to be obtained from the different streams are made.

TABLE OF CONTENTS.

Map showing geographical divisions or forest regions_Frontispiece

PAGES

Sources of information_____ 9–15
Bibliography _____10–15
Acknowledgments _____ 15
Principles of geographical classification_____17–22
Plan of regional descriptions_____23–34
The hill country and coastal plain contrasted_____35–36
The regions in detail_____37–128
Hill country_____37–71
1. Tennessee valley region_____37–47
A. Barrens, or Highland Rim_____37–40
B. Valley proper (including Brown's Valley)___40–47
2. Coal region (Carboniferous)_____47–57
A. Northern portion, or plateau region_____47–52
B. Southern portion, or basin region_____52–57
3. Coosa (Appalachian) valley region_____58–63
4. Blue Ridge_____64–66
5. Piedmont region_____67–71
Coastal plain_____72–128
6. Central pine belt_____72–84
A. Short-leaf pine belt_____72–77
B. Long-leaf pine hills_____78–81
C. Eutaw belt_____81–84
7. Black belt (cane-brake or prairie region)_____84–91
8. Chunnennuggee Ridge or blue marl region_____91–94
9. Post oak flatwoods_____95–97
10. Southern red hills (and "mountains")_____97–103
11. Lime hills (white limestone, etc.)_____103–107
12. Lime-sink region ("Wire-grass")_____108–113
13. Southwestern pine hills_____113–123
14. Mobile delta (estuarine swamps)_____123–126
15. Coast strip_____126–128
Illustrations (half-tone cuts of forest scenery)_____129–184
Barrens of Tennessee valley (figs. 1, 2)_____ 131
Tennessee valley proper (figs. 3-8)_____133, 135
Coal plateau region (figs. 9-13)_____137, 139
Coal basin region (figs. 14, 15)_____ 141
Coosa valley region (figs. 16-18)_____143, 145
Blue Ridge (figs. 19, 20)_____ 145
Piedmont region (figs. 21-24)_____147, 149
Short-leaf pine belt (figs. 25-27)_____ 151
Central long-leaf pine hills (figs. 28-30)_____ 153
Black belt (figs. 31-34)_____155, 157
Post oak flatwoods (fig. 35)_____ 159
Southern red hills (figs. 36-39)_____159, 161
Lime hills (fig. 40)_____ 163

Lime-sink region (figs. 41, 42) 165
Southwestern pine hills (figs. 43-48) 167–171
Mobile delta (figs. 49, 50) 173
Coast strip (figs. 51-53) 175, 177

Forest industries 179–183
Turpentine (figs. 54-56) 179
Miscellaneous (figs. 57-60) 181
Lumber (figs. 61-63) 183
Appendix A. Graphic representation of environmental factors 185–187
Appendix B. Climatological statistics 188
Appendix C. List of Alabama trees 189–191
Appendix D. Statistics illustrating present condition of the forests, rate of exploitation, etc., by regions 193–196
Appendix E. Statistics of Alabama forest products 197–206
Dressed and manufactured lumber 197–199
Rough lumber, etc. 199–200
Miscellaneous rough sawmill products 201
Naval stores 202–204
Timber-camp products 201–202
Conclusion 204–206
Index 207–222
Supplement
Geological Survey corps, 1913 223
Previous publication of the Survey 225–228

ERRATA.

Several typographical errors and a few omissions were overlooked in reading the proof, but the following are probably the only ones likely to mislead an intelligent reader.

Page 69, line 41, for cliffs read bluffs.

Page 97, line 4, for operation read proportion.

Page 113, add to list of references:—Schwarz (5, 10, 11).

Page 127. The third and fourth lines of the list of trees are partly transposed. They should read as follows:

Pinus clausa		Sheltered dunes
Juniperus Virginiana	Cedar	Bay shores mostly

On page 205 it should have been stated parenthetically or in a footnote, as an illustration of how the forests of distant regions are drawn upon to relieve the scarcity of timber in this part of the world, that even now shingles from the Pacific coast states are used in large quantities in Alabama and other eastern states.

Page 26, lines 24 and 25, for seedlings read pine seeds.

Page 168, second line of title, for west read east.

Page 189. Strike out second line of Appendix C and substitute the following:

foregoing pages, with a few unimportant exceptions, and is believed to be essentially complete for the.

SOURCES OF INFORMATION.

ALABAMA has probably been more thoroughly explored by various kinds of scientists than has any other southern state, and there is not very much to be said about its forests now that has not been said before, in one way or another. The present report differs somewhat from previous descriptions, however, in the way in which the geographical divisions of the state are classified and the descriptions of them arranged; and the quantitative analyses of the forests of each division, based on several thousand pages of field notes (representing about 200 locality-records for each species of tree, on the average), are entirely new, as are all but two of the illustrations.

Among the numerous publications dealing with the geography or the forests of Alabama it will perhaps be sufficient for the purposes of most persons who use this report if only a few of the more important or accessible ones are cited. Some of these, however, contain references to many additional works of similar nature which can be obtained without much trouble by any one who is sufficiently interested to go into the matter more deeply or scientifically. For the benefit of such persons there are included in the following list the titles of a few publications which, although they contain valuable information about certain parts of Alabama, are so little known or else so recent that they have not been mentioned in many bibliographies, particularly in the voluminous "Bibliography of Alabama" by Dr. Thomas M. Owen (who is now at the head of the State Department of Archives and History), published in 1898 in the annual report of the American Historical Association for 1897, pages 777-1248; and in the bibliographies of North American geological literature published every few years by the U. S. Geological Survey. (Bulletin 127 of that Survey, dated 1896, covers the period from 1731 to 1891, and there are several later ones for shorter subsequent periods.)

In the following list the names of authors are arranged alphabetically, and the writings of each chronologically.

Ball, (Rev.) T. H.—A glance into the great southeast, or Clarke County, Alabama, and its surroundings from 1840 to 1877. 782 pp. Grove Hill, 1882.

(Title-page and map missing in our copy. Title supplied by State Department of Archives and History.)

Mainly historical and biographical, but contains much interesting geographical information, especially on pages 120-130, 637-660, etc.

Bartram, William.—Travels through North & South Carolina, Georgia, East & West Florida, the Cherokee country, the extensive territories of the Muscogulges, or Creek Confederacy, and the country of the Chactaws; containing an account of the soil and natural productions of those regions, together with observations on the manners of the Indians. 522 pp. and a few plates. 12mo. Philadelphia, 1791. (Soon afterwards reprinted in London and Dublin, and also translated into French and German.)

The portion devoted to Alabama (which was then a part of Georgia) begins on page 388 and ends on page 457, but is not continuous. The author's route seems to have passed near the present sites of Fort Mitchell, Tuskegee, Montgomery and Mobile, both going and returning.

Berney, Saffold.—1. Hand Book of Alabama: a complete index to the state; with a geological map, and an appendix of useful tables. xxxix + 338 pp. Mobile, 1878.

Contains valuable chapters on geology by Dr. Eugene A. Smith, on soils by Dr. W. C. Stubbs, and on forests, grasses, etc. by Dr. Charles Mohr.

2. (Second edition of same.) 565 pp. Birmingham, 1893.

The chapter on forests in this edition is shorter than in the first, and not credited to any one.

Brumby, (Prof.) R. T.—Mineral resources of Alabama—mineral waters, &c. In F. A. P. Barnard's Alabama State Almanac for the year 1839, pp. 65-80. 12mo. Tuscaloosa, (1838?).

A very rare work, apparently not correctly cited in any previous bibliography. (Copy in Survey library presented by Dr. Smith.)

Caldwell, G. W.—("Caldwell the Woodsman")—The story of the southern evergreens. Country Life in America 7:171-176. (Illustrated by half-tones.) Dec. 1904. Also issued in pamphlet form, with some of the illustrations different.

Describes the beginning of the evergreen decoration industry in Conecuh County in 1888, and its development since that time.

Earle, F. S.—The flora of the metamorphic region of Alabama. Ala. Agric. Exp. Sta. Bull. 119. 80 pp. Auburn, 1902.

Includes also a small portion of the coastal plain, about as much of it as extends into Lee County.

Foster, J. H. (of U. S. Forest Service.)—Alabama forestry. Wilkinson's Handbook of Alabama (State Agric. Dept. Bull. 27), pp. 63-68. 1909.

Gosse, P. H.—Letters from Alabama (U. S.), chiefly relating to natural history. (Illust.) 306 pp. 16mo. London, 1859.
Deals mostly with Dallas County, and the Alabama River between there and Mobile.

Hale, C. S.—Geology of southern Alabama. Am. Jour. Sci. 56: 354-363. 1848.

Harbison, T. G.—A sketch of the Sand Mountain flora. Biltmore Botanical Studies, pp. 151-157. 1902.

Harper, R. M.—1. A December ramble in Tuscaloosa County, Alabama. Plant World 9:102, 104-107. 1906.
Deals with the vegetation along the cliffs of the Warrior River.

2. Some more coastal plain plants in the Paleozoic region of Alabama. Torreya 6:111-117. 1906.
Refers to Sand and Lookout Mountains in DeKalb County and the barrens of Limestone County.

3. Notes on the distribution of some Alabama plants. Bull. Torrey Bot. Club 33:523-536. 1906.

4. The vegetation of Bald Knob, Elmore County, Alabama. Plant World 9:265-269, fig. 44. 1907.

5. (Centers of distribution of coastal plain plants.) Torreya 7:42-45. Science II.25:539-541. 1907.
Contains a few notes on plants of the short-leaf pine belt in northwestern Alabama.

6. A botanical and geological trip on the Warrior and Tombigbee Rivers in the coastal plain of Alabama. Bull. Torrey Bot. Club 37:107-126, figs. 1, 2. 1910.
(A popular account of the same trip, with one half-tone illustration, appeared in Forest and Stream for June 17 and 24, 1911.)

7. A few more pioneer plants found in the metamorphic region of Alabama and Georgia. Torreya 10:217-222, fig. 1. 1910.
Contains some notes on the vegetation of the eastern slopes of the Blue Ridge in Clay County.

8. The forest regions of Alabama. Some statistics illustrating [the] present condition of [the] lumber industry in each division. Southern Lumberman (Nashville, Tenn.), vol. 69, no. 915, pp. 31-32. April 5, 1913. Also reprinted as a 4-page quarto pamphlet.

Harris, J. T., and Maxwell, H.—The wood-using industries of Alabama. Lumber Trade Journal (New Orleans), vol. 61, No. 9, pp. 19-30. May 1, 1912.
Contains valuable statistics which have been made use of herein, but several of the trees are erroneously identified.

Lyell, (Sir) Charles.—A second visit to the United States of North America. 16mo. 2 vols. New York and London, 1849.
Valuable geographical notes on Alabama in vol. 2, about pp. 37-77.

McCalley, Henry.—1. Alabama north of the Tennessee River. Rep. Geol. Surv. Ala. 1879-1880, pp. 67-154. 1881.
Notes on forests on pages 73-74, 86, 139-140, etc.

2. On the Warrior coal field. 571 pp. (Geol. Surv. Ala.) 1886.
3. Report on the Coal Measures of the plateau region of Alabama. (Including a report on the Coal Measures of Blount County by A. M. Gibson.) 238 pp. (Geol. Surv. Ala.) 1891.
4. Report on the valley regions of Alabama (Paleozoic strata). Part I, The Tennessee valley region. xvii + 436 pp., 4 figs., 9 plates. (Geol. Surv. Ala.) 1896.
5. (Same), Part II. The Coosa valley region. xxii + 862 pp., 14 figs., 25 plates. 1897.
All these reports of McCalley's contain abundant notes on the trees characterizing the various geological formations.

McGuire, W. W.—On the prairies of Alabama. Am. Jour. Sci. 26: 93-98 1834.

Mohr, Charles.—1. The forests of Alabama and their products. Berney's Handbook (cited above), pp. 221-235. 1878.

2. List of trees and shrubs characteristic of each region of the state. Rep. Geol. Surv. Ala. 1881-1882, pp. 291-297. 1883. (See Smith No. 7, below, for full title of this volume.)
The same list appears also in Tenth Census U. S. 6:67-69. 1884 (?).
3. (Notes on the forests of Alabama.) Tenth Census U. S. 9:525-530. 1884.
4. The mountain flora of Alabama. Garden & Forest 5:507-508. Oct. 26, 1892.
5. The timber pines of the southern United States. (Together with a discussion of the structure of their wood, by Filibert Roth.) U. S. Dept. Agriculture, Div. Forestry, Bull. 13. 160 pp., 27 plates. 4to. 1896.
6. (Revised edition of same Bulletin 13, with additional notes by Dr. Roth.) 176 pp., otherwise similar. 1897.
7. Report on the forests of Sand Mountain. The Forester 4: 211-215. Oct. 1898.
8. Plant Life of Alabama. An account of the distribution, modes of association, and adaptations of the flora of Alabama, together with a systematic catalogue of the plants growing in the state. Contributions from the U. S. National Herbarium, vol. 6. 921 pp., 13 plates. July 31, 1901.
Also issued by the Geological Survey of Alabama, with the addition of a biographical sketch of the author (by Dr. E. A. Smith) and portraits of him and Judge T. M. Peters, in October, 1901.
Dr. Mohr was the author of about 100 scientific papers, but the above, especially the last one, contain the essence of practically all that are of importance to the student of Alabama forestry. His magnum opus, the Plant Life of Alabama, is doubtless the best description yet published of the vegetation of any whole state or similar area. Unfor-

tunately it was not published until after his death, and it seems to have undergone considerable editing in Washington, so that it may not represent his views exactly.

Numerous other titles by Dr. Mohr can be found in Owen's Bibliography of Alabama, referred to on a preceding page.

Reed, F. W.—A working plan for forest lands in central Alabama. U. S. Dept. Agriculture, Forest Service, Bull. 68. 71 pp., 4 plates, 2 maps. 1905.

Comprises excellent descriptions of two large tracts of long-leaf pine timber belonging to the same company; one in the foot-hills of the Blue Ridge in Coosa County, and the other in the central pine belt, chiefly in Bibb and Hale Counties.

Schwarz, G. F.—The long-leaf pine in virgin forest. 16mo, xii + 135 pp., 23 full-page half-tone figures in text, colored map, and 2 folded diagrams. New York (May), 1907.

Based partly on studies made in Baldwin Co., Ala. Contains valuable notes on the effects of fire, among other things.

Smith, Eugene A.—1. Geological Survey of Alabama. Report of progress for 1874. 139 pp. 1875.

Describes the Blue Ridge and Piedmont regions, with occasional notes on vegetation.

2. (Same for 1875.) 220 pp. 1876.

Chiefly devoted to the Coosa valley region, in Bibb, Shelby, Talladega and Calhoun Counties.

3. (Same for 1876.) 100 pp. 1876.

Describes Roup's and Jones's Valleys and the Coosa coal field.

4. (Same for 1877 and 1878.) 139 pp., 4 colored geological maps of single counties. 1879.

Describes the Tennessee valley region and the western parts of the coal region, treating several counties in considerable detail.

5. (Same for 1879 and 1880.) 158 pp., 2 maps. 1881.

Includes description of part of the Warrior coal field, and McCalley's report on the northern tier of counties. (See McCalley 1, above.)

6. Report on the cotton production of the state of Alabama, with a discussion of the general agricultural features of the state. Tenth Census U. S. 6:3-173, 2 colored maps. "1884." (Some copies must have been in circulation as early as 1883, for there is internal evidence that this was printed before No. 7.)

A remarkably complete geographical description of the state, by natural divisions and by counties, with many soil analyses, and two special chapters on cotton production. More accessible than the next, having been published in a much larger edition, but a little inconvenient to refer to on account of its quarto size and double system of page-numbers. (The page-numbers of this work cited in the several

regional descriptions beyond are those at the bottoms of the pages, which are the fundamental ones, the more conspicuous ones at the tops belonging only to this one report and not to the whole volume.)

7. Geological Survey of Alabama. Report for the years 1881 and 1882, embracing an account of the agricultural features of the state. xvi + 615 pp., 8 colored maps. 1883.
   Pages 1-154 comprise a general treatise on soils, while the remainder of the book, exclusive of the six climatological maps and the very full (58 page) index, is essentially the same as No. 6. Unfortunately this has long been out of print.

8. (With the assistance of L. C. Johnson, D. W. Langdon, Jr., and others.) Report on the geology of the coastal plain of Alabama. xxiv + 759 pp., 29 plates. (Geol. Surv. Ala.) 1894.

9. The underground water resources of Alabama. xvi + 388 pp., 30 plates. (Geol. Surv. Ala.) 1907.
   Of Dr. Smith's very numerous contributions to the knowledge of Alabama geology and geography, the foregoing seem to be the principal ones that contain descriptions of forests. Many additional titles can be found in Owen's Bibliography of Alabama, and in U. S. Geological Survey Bulletins 127, 188, 301 and 372.

Stelle, (Prof.) J. P. (agricultural editor, Mobile Register)—An outline expose of the geological, agricultural, hygienic and other interesting characteristics of Mobile County, Alabama; embracing surface configuration with area, geological formations with useful materials, timber with other valuable growths, soils, agricultural capabilities and hygienic peculiarities. 8vo. 26 pp. Mobile, 1888.
This is one of the most complete and impartial county descriptions ever published, in Alabama or anywhere else.

Tuomey, M.—1. First biennial report on the geology of Alabama. xxxii + 176 pp. Tuscaloosa, 1850.

2. Second biennial report on the geology of Alabama. (Edited after the author's death by Dr. J. W. Mallet.) xix + 292 pp. and colored geological map. Montgomery, 1858. (Pages 223-252, on the Cretaceous and Tertiary, are by E. Q. Thornton.)

U. S. Department of Agriculture, Bureau of Soils.—Soil surveys of various Alabama counties.
About half the counties in the state have been surveyed by this organization since 1902, after the first few years in co-operation with the state agricultural department. The resulting maps are useful, and some of the accompanying geographical descriptions are very good; but in the majority of cases the authors were not sufficiently familiar with previous literature on the same regions and with the local geography, geology and botany, a condition which has caused serious errors in their reports.

Webb, (Dr.) R. D.—The relation of geological formations and of soils to malarial fevers, as exemplified in Sumter County, Alabama. Trans. Med. Assoc. Ala. 34:285-306. 2 folded colored maps. 1881.

Wilkinson, J. A. (compiler).—[Handbook of] Alabama. State Dept. Agriculture and Industries, Bull. 27. 388 pp., including numerous unnumbered full-page half-tone illustrations. 1909.

A compilation of miscellaneous information about the state, without maps, table of contents, or index. At pages 254 and 358 articles commending the work of the U. S. Bureau of Soils are appended to chapters contributed by Dr. Smith in such a way as to give a false appearance of having been written by him.

Winchell, A.—Notes on the geology of middle and southern Alabama. Proc. A. A. A. S. 10 (part 2): 82-93. 1857.

On pages 87-88 the author has some notes on the vegetation of the Buhrstone region, and comments on the abundance of evergreens.

For assistance in the preparation of this report, or for their sympathetic interest in it, the writer is especially indebted to Hon. R. E. Pettus of Huntsville, Col. S. W. John of Birmingham (now of Dallas County), Mr. Joshua Franklin of Erin, Clay Co., Mr. Daniel Pratt of Prattville, Mr. J. A. Avant of Gadsden, and Mr. A. L. Barker of the University of Alabama. Many students of the University, some of whom will doubtless be heard from often in later years, have contributed valuable information about the forests and forest products of their home counties.

It would obviously be impossible to give a reasonably complete description of forest conditions in Alabama without spending many years in exploring the state, and publishing a large volume on the subject; and furthermore, some regions have necessarily been visited more recently than others, a circumstance which naturally tends to make some difference in the freshness of the descriptions. Hence it is hoped that persons who may find their own neighborhoods inadequately or inaccurately described in this brief report will bear these facts in mind when pointing out its shortcomings. Additions and corrections of any kind will always be gratefully received.

PRINCIPLES OF GEOGRAPHICAL CLASSIFICATION

ALABAMA is such a diversified state that it would be impracticable to treat it as a unit in describing its forests. It is desirable therefore to subdivide the area into a number of forest regions, each of which shall be as distinct and nearly homogeneous as possible. As a matter of expediency the subdivisions should not be very numerous, for that would make some of them too small to be shown satisfactorily on a map of convenient size, and require too much repetition in describing them all. In the present report fifteen main divisions are recognized, and some of them subdivided into two or three.

It is a fact so well known as not to need any demonstration that differences in type of forests (or other vegetation), excepting of course differences produced artificially, are nearly always correlated with differences in climate, moisture, soil, or other environmental factors. Hence it is customary in subdividing any area geographically to base the classification of subdivisions on environmental factors which can be measured or mapped more precisely than can the forest types themselves. But it is not always easy to decide just which factors are most significant in this connection.

Obviously factors which change somewhat abruptly along definite lines are better adapted for the purposes of geographical classification than are those which vary more gradually and uniformly from place to place; so that the ideal system is one in which the boundary between any two adjoining regions corresponds with a comparatively sudden change in one or more environmental factors.

Among the factors influencing tree growth in a state of nature are light, heat, density of the air; amount, composition and fluctuations of water; texture and composition of soil; frequency of fire; character and amount of subterranean life (bacteria, fungi, worms, insects,

etc.); friends and enemies in the animal kingdom, and competition of other plants of the same or different species; as well as some characters of the trees themselves, such as the history of their migrations, and their adaptations for dissemination.

We can readily believe that if the force of gravitation or the composition of the atmosphere varied much in different parts of the world these variations would give rise to important differences in vegetation; but as it is, these factors are so uniform over the whole earth that they have no appreciable geographical significance. Terrestrial magnetism, atmospheric electricity, radioactivity, and the movements of the moon and other celestial bodies may have some influence on vegetation, but these influences are as yet unknown, so that we need not consider them further at present.

Geological history is doubtless a very important geographical factor, but we do not yet know enough about its details to separate its effects satisfactorily from those of present environment. The **density of the air**, which varies with altitude, probably affects plants somewhat (as it certainly does animals), but such effects, if any, are obscured by corresponding altitudinal variations in light, temperature, and atmospheric humidity, whose effects are much better known, for they can be more easily isolated by experimental control. **Altitude**, although very easy to measure and map with accuracy, hardly needs to be taken into consideration in Alabama, for within our limits there is about as much difference of average annual temperature due to latitude (with a range of nearly five degrees) as to altitude, with a range of only 2,400 feet. And nearly all the trees growing on the highest mountains of Alabama can be found flourishing at much lower altitudes in the immediate vicinity or even considerably farther south.

Temperature is a very important factor in differentiating the vegetation of tropical, temperate and arctic regions, and the great differences betwen the vegetation of humid and arid regions can safely be ascribed mainly to differences in the yearly amount of **precipitation**; but within the limits of a single state like ours neither of

these climatic factors varies enough from one place to another to overshadow the more obvious effects of soil, ground-water, etc. (The differences between the vegetation of the northeastern and southwestern parts of the state are indeed doubtless due in part to temprature, but there are no differences in vegetation in Alabama that can be reasonably ascribed to differences in average annual rainfall.

Worse still, climatic factors, except in a few special localities like the summits of high mountain ranges, vary gradually from place to place, so that the location of lines based on any one of their numerous functions, such as average, maximum and minimum temperature, length of growing season or period between frosts, and seasonal variations of rainfall, is in general wholly arbitrary, and likely to be influenced largely by the scale used (whether Fahrenheit or Centigrade in the case of temperature, or inches or millimeters in the case of rainfall).*

Almost equally worthless for our purposes are those environmental factors which vary greatly in short distances, such as **light** (governed by slope of ground, density of forests, etc.), **evaporation** (governed largely by the same factors), and **soil moisture** (governed largely by topography). Such factors are very useful for distinguishing local forest types, such as swamps, ham-

*But for the difficulty mentioned in this paragraph it might be worth while to give some consideration to the seasonal distribution of rainfall, which varies perceptibly in different parts of our state. This is well illustrated by the three rain maps between pages 176 and 177 of Dr. Smith's report on the agricultural features of Alabama (Smith 7 in bibliography). The lines on the last map, showing annual rainfall, do not correspond very closely with the known distribution of any trees (or anything else, apparently), but the other two maps show that there is a general correspondence between hardwood forests and regions of heavy winter rains (December to February), and between the principal long-leaf pine area and heavy summer rains (June to August). But the distribution of forest types can be correlated much more staisfactorily with soil, which seems to be much more closely connected with geology than with climate; and it is possible that the relative proportion of pines and hardwoods in the forests has some influence itself on the seasonal distribution of rainfall, whose irregular distribution on the map would be difficult to account for otherwise. (In this connection see footnotes by the writer in Bull. Torrey Bot. Club 37:415-416. 1910; Torreya 12:146. 1912.)

mocks, and pine woods, within a region, but not for delimiting regions large enough to show on a state map.

Another difficulty that is unavoidable in the use for geographical purposes of any one simple factor, such as altitude, or any function of temperature or rainfall, that can vary in only one direction (i. e., from greater to less, or vice versa), is that all zones based on single factors must be parallel, so that each one can touch only two others, as is well illustrated by a hypsometric or climatic map on which the various altitudinal or temperature zones are shaded differently. It is indeed true that in some restricted areas the various types of forest are distributed to some extent in parallel zones; but if any one of these zones is followed far enough it will as a rule be found to narrow down and disappear, or run up against some other zone (there are several examples of both cases on the map of Alabama accompanying this report); which can never happen with climatic or altitudinal zones. There are also many forest regions that are about as broad as they are long; so that a true map of forests (or any other kind of vegetation) would look something like a mosaic, or a crazy-quilt.

Topography and **soil** are not open to the objection just mentioned, for they are complex features, and may vary in an indefinite number of ways. Topography however does not affect vegetation directly as much as it does indirectly through its influence on the local distribution of soil types, ground-water, and sunlight. Soil is almost universally admitted to be of fundamental importance to vegetation, and soils are comparatively easy to map—after a satisfactory classification for them is devised*—, for the several types are usually distributed in fairly well-defined patches.

The smaller soil units are too small and too numerous for our present purposes, but it is possible to group them roughly according to certain characters into classes or regions, each large enough to be shown on a state map.

*For a recent discussion of the problems of soil classification see E. O. Fippin, Science II.35:677-686, May 3, 1912. Also Bulletin 85 of the U. S. Bureau of Soils, by G .N. Coffey. November, 1912.

In a featureless plain it might be difficult to decide where to draw the line between different classes of soils, but topographic diversity facilitates matters considerably by affording distinctions between wet and dry soils, ridge and valley soils, residual and colluvial soils, etc.

Although the geological age of a rock may have little direct influence on the vegetation growing above it, soil and topography are so intimately connected with geology that a geological map is of fundamental importance to the student of forest geography, in some parts of the world at least.*

The correlations between geology, topography, soils and vegetation, although not very evident in some of the colder and hotter parts of the world, are perhaps nowhere more clearly exhibited than in Alabama; and the map accompanying this report does not differ conspicuously from a geological map of the same size.

In the northeastern quarter of the state the chief differences are due to the fact that in some of the valleys several different Paleozoic formations crop out in a succession of long narrow belts which cannot be shown on such a small map as this. And furthermore, while it is possible to map the outcrops of formations where they are only a few yards wide—if a sufficiently large scale be used—, the soils are often less diversified than the underlying rocks, or mixed (especially on steep slopes), topography cannot be studied to advantage in an area of less than several hundred acres, and it has not been found practicable to have geographical divisions, of the rank here considered, less than a few miles wide, or too discontinuous, either. In the valley regions therefore the various geological formations, though often very distinct, are regarded as indicating local forest types rather than distinct regions.

In the northwestern quarter there is a rather wide transition zone between the coal region and the central pine belt, where the unconsolidated strata of the latter

*The diagram in Appendix A will make the relations of all these environmental factors to each other and to the forests a little plainer to students and other interested persons.

cover the uplands while many of the streams have cut down into the hard rocks of the former, causing an extensive overlapping, or rather interlocking, of two more or less distinct kinds of country. On a large map this interlocking could be shown pretty accurately, but in the present case the best that can be done is to strike an average between the two regions as nearly as possible, by means of a dotted line.

In the southern tier of counties, especially eastward, the geology has to be partly disregarded for a different reason. There the strata are nearly level, and at the same time variable and poor in fossils, and the geologists themselves are not yet fully agreed upon how they should be mapped; but it is possible to define geographical divisions in that quarter pretty well on a basis of soil, topography and vegetation, without knowing much about the geology.

The principal sources of information for the present map, arranged chronologically, are as follows:

1. Agricultural map of Alabama by Dr. Eugene A. Smith, 1883. (Smith 6 and 7 in bibliography.)

2. Large geological map of Alabama, with explanatory chart, also by Dr. Smith, 1894. (A smaller edition of this map, first issued in 1904, resembles the present geographical map in size and to some extent in the absence of minute details.)

3. Small geographical map by Dr. Smith in J. H. Phillips's Alabama supplement to Frye's Complete Geography, 1897.

4. Map of floral areas, frontispiece of Mohr's Plant Life of Alabama, 1901. (Mohr 8 in bibliography.)

5. Some of the government soil maps of Alabama counties. (See U. S. Dept. Agriculture in bibliography.)

6. Field work of the writer, 1905-6, 1908, 1910, 1911, 1912-13, extending into every county. The principal innovations from this source are in the southeastern quarter of the state.

PLAN OF REGIONAL DESCRIPTIONS.

THE description of each natural region into which the state is here divided follows as nearly as possible the following plan, the amount of space given to each head varying with the character of the region.

Location and area. External relations.
References to previous literature.
Geology and soils.
Topography and hydrography.
Climate.
Types of forest. Frequency of fire.

LIST OF TREES.

Percentage of evergreens. Other noteworthy features of the list.
Economic aspects.
Density of population. Increase in last decade. Percentage of whites.
Relative area of forests and clearings.
Status of stock laws.
Changes in relative abundance of certain species, from various causes.
Principal forest products and wood-using industries.
Illustrations.

Location and external relations.—The location of each region is not described in detail, for that is indicated with sufficient exactness by the map. As most of the regions are not confined to Alabama, some account of their extent outside of the state is appropriate.

References.—In the references to literature the titles in the foregoing bibliography are not reepated, but only the author's name and the number of his paper (if more than one by that author is listed), and then in parentheses the numbers of the pages on which the region under consideration is described, if they are not too numerous.

The **geology and soils, topography and hydrography,** are described very briefly. Full geological details can be found in several of the reports cited in the bibliography.

Climate.—For convenience of reference all the climatic data used herein are collected on a single page, which follows the regional descriptions. (Appendix B.)

Statistics from 23 different weather stations, all based on at least 15 years' observations, have been compiled from Bulletin "W" of the U. S. Weather Bureau, and from the annual summary of the Alabama section of that Bureau for 1911. The data here published include only the mean annual temperature, the average length of the growing season (period between the last killing frost in spring and first killing frost in fall), the average annual precipitation, and the percentage of the total annual rainfall that comes in the four warmest months, June to September inclusive, and in the six warmest months, May to October, inclusive.

It has already been pointed out (page 19) that some parts of Alabama are characterized by wet winters and others by wet summers; and the percentages of rainfall for the four warmest months seem to bring out the contrasts in this respect better than do those for any longer or shorter period or for any other portion of the year. The six months percentages are added to facilitate comparison of conditions in Alabama with those in the rest of the United States, as mapped by Dr. Henry Gannett on Plate 2 of U. S. Geological Survey Water Supply Paper No. 234, published in 1909. That map represents the percentage of rainfall for "the six warmer months, April to September, inclusive"; but in Alabama and most other parts of the eastern United States October is usually a little warmer than April, and furthermore it is usually drier than April in the regions that have dry summers, and wetter than April in the regions that have dry winters, so that the figures for May to October give greater contrasts than those for April to September would.*

*It is interesting to note that in general where the summers are wettest the soils are sandiest, and vice versa, in the southeastern United States at least. Of course the correlation is not absolute, and there are many areas of clay soil in regions with wet summers, and of sand in regions with dry summers, for the texture of the soil depends on many other factors than seasonal distribution of rainfall, which indeed has hitherto scarcely been recognized as a factor in the problem at all. To attempt to explain this correlation would be out of place in such a report as this, as it seems to be a matter of soil chemistry primarily. It is possible, though, that the relation may be partly reciprocal, or accidental. For example, the black belt of Alabama and Mississippi is characterized

In the regional descriptions all the climatic statistics are not repeated, but only the salient features pointed out.

Forest types.—The treatment of forest types is rather brief and superficial, for an exhaustive discussion of this feature would require a great deal more space, and would be of less economic than scientific interest. Abundant details can be found in Mohr's Plant Life of Alabama, previously referred to.

Fire.—The frequency of fire is noted under the head of forest types, for it varies greatly in different kinds of forests, as well as in different regions. In general the effect of fire in a forest is to keep down underbrush and trees with thin bark or low branches, and thus favor the growth of trees with thick bark and clear trunks, such as most of the pines.* It also returns quickly to the soil the potash and other mineral substances accumulated in fallen leaves, but drives off the organic matter, which would otherwise make the soil more nitrogenous. It may also destroy some insects which would otherwise injure the trees. Most persons who have written about forest fires, especially in the northern states, where such fires are often much more spectacular and awe-inspiring than they are with us, seem to regard them as an unmitigated evil, or as regrettable accidents, to be prevented by all possible means. In reality, however, fire is a part of Nature's program in this part of the world, and the woods were undoubtedly set on fire by lightning and perhaps other natural causes long before man appeared on the earth. The frequency of forest fires varies greatly in different regions, and in general they are most frequent today in the same regions where they were most frequent in prehistoric times. Fires are and always have been rare in hardwood regions with wet winters and dry summers, like the Tennessee valley and

by wet winters and dry summers, and its soils are decidedly clayey; but its soil characters are closely correlated with the geological formation, which is certainly independent of any modern climatic factors.

*This fact was noted by Sir Charles Lyell in Tuscaloosa County in the spring of 1846. See page 69 of his book cited in the bibliography.

the black belt, where the forest floor is covered with humus, usually too damp and too thoroughly oxidized to burn readily.

In the long-leaf pine regions, where environmental conditions are different in almost every way from those just mentioned, fire seems to have swept over every spot not protected by its topography or otherwise every few years in prehistoric times. There the fire consumes the herbage that covers the ground, and prevents the growth of most thin-barked trees, but does very little harm to the long-leaf pine after that reaches the age of four or five years. This pine withstands fire better than any other tree we have, but some of the other pines and a few of the oaks and hickories are not much inferior to it in this respect.

It can be safely asserted that there is not and never has been a long-leaf pine forest in the United States (and that species does not grow anywhere else) which did not show evidences of fire, such as charred bark near the bases of the trees; and furthermore, that if it were possible to prevent forest fires absolutely the long-leaf pine—our most useful tree—would soon become extinct. For where the herbage has not been burned most of the seeds ~~lings~~ lodge in the grass and fail to germinate, and if the oaks and other hardwoods were allowed to grow densely they would prevent the growth of the pine, which cannot stand much shade, especially when young.

At the present time most of the fires in the pine woods are set purposely, to burn off the dead grass and improve the grazing. This practice has been repeatedly denounced by persons who have spent most of their lives outside of the long-leaf pine regions, but really the only just criticism of it that can be made is that it is done too often; oftener than Nature intended, one might say. However, as the number of roads, railroads, clearings, etc., increases, the area over which each fire can spread becomes more and more restricted, so that the frequency of fire at any one point may not be much greater now than it was originally.

The mixed pine and oak woods which constitute a very large proportion of the forests of Alabama and other southeastern states occupy an intermediate position between the rich shady hardwood forests and the open long-leaf pine forests with respect to fire. In these woods fire often consumes the dry leaves in late fall, and even though it does little harm to the trees it tends to impoverish the soil by driving off the nitrogen and other organic matter contained in the leaves, so that it does not seem to be good policy to set fire to such forests purposely, at least where the land is likely to be used for cultivation at some future time.

Lists of trees.—The lists of trees for each region have been prepared with considerable care, and are probably not far from complete in most cases, for all but the rarest species. The species are arranged in the same order in each list, beginning with the pines and ending with those trees which are generally regarded by botanists as most highly organized. This method does not bring out the contrasts between the different regions quite as plainly as it would to arrange the species in order of abundance, but it is more convenient for finding quickly in any list the name of any particular tree.

Each line in these lists begins with two numbers. The first represents the proportion of the area of the original forests of each region supposed to have been occupied by each species, and the second shows the same thing for the present forests. These ratios are expressed in percentages, and are given only to the nearest unit, so that all percentages less than ½ are represented by 0. Species which make up less than one-tenth of one per cent of the forests of any region are usually omitted, as having little significance. The first figure is more or less of a rough estimate, while the second is derived from my field-notes by a rather complex and laborious method, which need not be explained here. Great accuracy cannot be claimed for these figures, but they are much better than what we have had before (viz., none at all), and perhaps none of them will prove to be more than double or less than half the correct figures which may be ultimately obtained. There are of course more precise

methods of estimating timber than that here employed, but to apply these over a whole state in sufficient detail to get better results than those presented here would take one person many years.

Where the second figure is larger than the first it does not necessarily mean that that species is more abundant now than it was originally. Those species whic have increased in abundance relatively are either those wihch tend to spread in clearings, those which are confined to soils not well adapted for agriculture, or those which have simply been left standing while more desirable species have been cut out from among them. On the contrary, therefore, the trees which have decreased in abundance usually prefer the better soils, or are more valuable for lumber, or both. To get an estimate of the present stand of any species in any region the percentage of present abundance should always be multiplied by the estimated percentage of remaining forest in that region, which is given after the list of trees.

Where the whole technical name is printed in bold-face type it means that the species is evergreen, and where only the specific name (second word) is in bold-face the species is partly evergreen.

For each species both technical and common names are given, except in the case of a few trees which are so little known to the general public that they seem to have no bona-fide common names. Only common names that are actually used by a large number of people in this state are considered. The names applied to our trees in northern books are not always the same as those used in these parts, some of them being mere translations of the technical names, and therefore obviously not genuine, and not deserving of perpetuation.

After the name of each tree its usual habitat in the region is indicated in two or three words.

The percentage of evergreens, which is obtained by simply adding together the percentage-numbers of those species that are evergreen, throws an interesting light on the character of the forests of the several regions. In general a large percentage of evergreens seems to be correlated with small seasonal fluctuations of ground-

water, wet summers, streams comparatively free from mud, and sandy soils poor in potassium, if not in other elements of fertility. Just which of these factors are fundamental and which are secondary is not at present obvious.

Economic aspects.—In taking stock of our forest resources it is of course of the utmost importance to determine not only the composition of the forests but also the amount of forest still standing. No recent statistics on the latter point for areas smaller than the whole state, and taking into consideration both cultivated and abandoned fields, are available, so that only rough estimates can be given. But the amount of cleared land is pretty closely correlated with density of population, and that is known with considerable accuracy. The figures for the population of each region have been deduced from the reports of the 13th Census of the United States, and ought to be reasonably accurate. The chief difficulty here is due to the fact that the census figures are given for counties and other civil divisions, which do not correspond very closely with natural divisions. The best that can be done in the absence of maps showing beats is to combine the areas and populations of all counties wholly or mainly included in a given region, and make the computations accordingly.

It is a very obvious fact, though not often mentioned, that in a state as thickly settled as Alabama our friend the farmer has done more damage to the forests than all other agencies combined, for his operations involve a total destruction of the forest in the areas he cultivates. A great deal of this destruction is of course unavoidable; but if the farmers could be taught to cultivate more intensively and use less wasteful methods a much larger area could be kept forested.

The conservationists are inclined to blame the lumberman most for the rapid exhaustion of the forests which our generation is witnessing. Dr. J. B. Killebrew, in an address delivered at the Tennessee Centennial Exposition in 1897, spoke of lumbering practices in that state in the following vigorous language: "Our present destructive methods combine the stupidity of unthinking bar-

barism and the cupidity of unprincipled selfishness with the wantonness of unbridled license." The same could be applied with equal justice to almost any state in the Union; and the lumberman certainly deserves some censure.

And yet if it were possible for us all to live on fish, game, wild fruits, etc., or on food manufactured from the atmosphere, without cultivating the soil, Alabama could come pretty near supplying the whole South with timber. Thirty years or more ago it was confidently predicted by conservative scientists that the pine forests of West Florida and adjacent Alabama would be exhausted in a very few years; but there are still immense areas of virgin timber in that section, simply because the soil is not very rich, and the population is still so sparse that if every able-bodied inhabitant should engage in lumbering they could hardly keep the trees cut down. Vast forests are still standing in Maine, Minnesota, Canada, etc., not because their resources are unknown or of little value, but because the soil and climate of those regions are not favorable to agriculture.*

Stock laws.—The ranging of domestic animals in the forests, where it is still permitted, has an important influence, tending to retard the growth of underbrush and of some trees and probably favoring others, somewhat as fire does. Like fire, grazing returns mineral plant foods quickly to the soil, but unlike fire, it also returns nitrogen, probably with interest. Every county and beat in the state decides for itself whether stock shall be allowed to run at large within its borders or not; and these local laws do not seem to be codified, so that it would be impossible to ascertain their exact status throughout the state at the present time without a great deal of correspondence with county officials. In general, however, in regions where there is still considerably more forest than farm land the cattle, sheep, hogs, etc., are allowed free

*An interesting paper by Hu Maxwell on the timber resources of the South, on pages 41 and 42 of "The South the nation's greatest asset"—which is part 2 of the Manufacturers' Record for March 27, 1913 (vol. 63, no. 12)—brings out still more clearly the fact that the exhaustion of our forests is not as imminent as some have predicted.

range on any unenclosed land, and farmers have to protect their crops and yards from them by fences. Where farms are in the majority the stock law or "no-fence law" prevails, the stock being kept within enclosures and the fields therefore not requiring fences.*

In each regional description the present status of the stock law, as determined from newspaper items and soil survey reports, interviews with students and citizens, and observations made in traveling through the various regions, is summed up in a few words, as accurately as the information at hand permits.

Forest products.—The lists of the principal forest products of each region are derived from personal observation, interviews, and examination of available literature; and the various items in each list are arranged approximately in order of value of total output. Completeness of such data is of course out of the question, but they are probably just about as nearly complete for one region as for another.

In deciding just what to include under the designation of forest products only articles made from native trees and sold, either in local markets or for export, are considered. This excludes two extremes; first, such articles as buggies, show-cases, furniture and cotton gins, made in towns and cities from wood largely imported from other regions, states or countries; and second, articles produced strictly for home use, such as the fuel, fence rails and posts, axe-handles, cotton baskets, etc., which almost every farmer gets from his own woods. Stove-

*In the last ten years or so, since attention has been drawn to the importance and feasibility of eradicating the cattle-tick in the South, some agricultural editors have been urging the substitution of state-wide stock laws for the present local option system, because tick eradication is much easier where cattle are confined than it is on open ranges. But a stock law would be unfair to persons of limited means who are raising cattle and hogs in thinly-settled counties, for it would deprive them of the use of the abundant natural pasturage. It might however be a good idea to have a state-wide law for a few years (just as certain species of game are sometimes protected for a few years in certain states), with the understanding that the present system would be restored after the extermination of the ticks. It might also be desirable to impose greater restrictions on hogs than on cattle, since the former seem to be more destructive.

wood cut by farmers and sold in near-by towns would be appropriate to include, if any statistics about it were available, but it is so common and familiar in all regions where there are any woods at all that it hardly needs to be considered.

Unfortunately no accurate quantitative estimates of the forest products of each region can be made from the information at present available. Some publications of the U. S. Forest Service and Census Bureau give valuable statistics for the whole state, which have been utilized in Appendix E, but they are of no value for regional descriptions, for they do not consider counties or other geographical subdivisions of the state. The paper of Harris and Maxwell on the wood-using industries of Alabama, cited in the bibliography, likewise treats the state as a unit for statistical purposes, but it also contains a list of over 200 wood-working establishments of higher rank than sawmills, with the location of each, from which a rough calculation of the relative number of such establishments in each region can be made.

Still more useful is a directory of the sawmills and other wood-working establishments of Alabama, published in the latter part of 1912 by the *Southern Lumberman*, a weekly magazine of Nashville, Tenn. This lists about 600 sawmills and 100 other establishments, and is probably nearly complete for all mills large enough to ship their products by rail or water. It gives no statistics of production, but tells almost everything else that one might wish to know about our sawmills, including the name and location of each, the character of its equipment (including length of railroad operated, if any), the kind of stock turned out (i. e., whether ordinary lumber or veneers, crates, cooperage stock, handles, vehicles, furniture, etc.), the daily capacity, and the kinds of wood used. From this directory it is a simple matter to count the number of mills sawing each kind of wood in each region, and compute their average capacity. In summing up the information derived from this source in the regional descriptions those kinds of wood cut by only one mill in a region are usually omitted for the sake of brevity. With this exception the num-

ber of mills given for each species of tree is roughly proportional to the percentage of abundance of that tree in the region.

All these statistics obtained originally from lumbermen are a little defective for the reason that lumbermen recognize fewer species of trees than botanists do. Harris and Maxwell report only 38 species from Alabama (including a few imported ones), and the *Southern Lumberman* only 34; the two lists together comprising about 40 native species; while as a matter of fact there are at least 50 native trees in Alabama that are used for lumber.

For example, the long-leaf and slash pines are not usually distinguished by lumbermen, and the "long-leaf pine" which some of the mills in the northern tier of counties claim to cut is probably neither of these. The "short-leaf pine" of the trade also includes two and possibly three species. It seems improbable that any real white pine, which does not grow within fifty miles of Alabama, should be brought into the state to be sawed, but we have two native pines with pretty soft wood, one in the northern half of the state and one in the southern, which may be called by that name. A few of the mills in the Southern Lumberman's directory report spruce, another northern tree, but probably mean spruce pine, a name which is applied locally to two or three of our trees.

Our two cypresses are not distinguished in the statistics (for although lumbermen often speak of white, black, and red cypress, it does not seem possible to correlate these names definitely with botanical species), but as the pond cypress in Alabama is confined to regions 12 and 13, there is very little uncertainty about the identity of the cypress reported from other regions.

Harris and Maxwell mention only six oaks (and some of those probably wrongly identified) and the *Southern Lumberman* only two, white and red. The "white oak" of the trade probably includes some post oak, swamp chestnut oak, and a few other related species, and the "red oak" may be almost any of the numerous species with biennial acorns, bristle-tipped leaves and inferior

wood, including the water and willow oaks, which are not listed separately by the *Southern Lumberman*.

The various hickories, elms, maples, ashes, etc., are not distinguished in these publications, but lumbermen could hardly be expected to do that, as their woods are very similar. The "red gum" of the lumber trade is a comparatively new name for the old familiar sweet gum, whose wood was not regarded as having any value until the scarcity of poplar began to be felt. Tupelo gum is another wood which has come into use very recently, for a similar reason; and the "tupelo" of the trade may possibly include some of its near relative black gum, which is not listed separately. Bay, listed by Harris and Maxwell as "sweet magnolia," and said by them to be cut in Alabama at the rate of 148,000 feet a year, is not mentioned in the Southern Lumberman's directory, but may be combined in that with some other wood of the same family, such as poplar, cucumber or magnolia.

In the interpretation of the statistics of kinds of wood cut in each region the facts just mentioned need to be constantly borne in mind.

Illustrations.—All the half-tone figures are from the writer's own photographs, except a few taken in former years by Dr. Smith and other members of the Survey, all of which are properly credited. Some of the latter are especially valuable as showing the appearance of virgin pine forests which have since been destroyed.

THE HILL COUNTRY AND COASTAL PLAIN CONTRASTED.

THE subdivisions of Alabama which are about to be described fall naturally into two classes. Those numbered 1 to 5, covering about two-fifths of the area of the state, constitute the hill country or mineral region, while the remainder belong to the coastal plain, which borders the coast from New York to Mexico, and is poor in minerals, water-power and mountain scenery, but rich in agricultural and timber resources. The line between them is called the fall-line, because most of the rivers which cross it have falls there.

In the hill country of Alabama the rocks are all Paleozoic and older, except for a few local alluvial deposits, etc., and some of them are very much folded and faulted; while in the coastal plain there are no strata older than Cretaceous, and they have been very little disturbed by movements of the earth's crust ,having in most places a gentle dip to the southwestward or away from the hill country. This difference in geological age is the fundamental distinction, but there are others which can be easily made out by persons who are not geologists. Almost everywhere in the hill country hard rocks abound and sand is scarce; while the reverse is true over the greater part of the coastal plain (more so farther east than in Alabama, though). In most parts of the coastal plain the fossiliferous strata are covered to a depth of several feet with a layer of loam or sand, or sometimes both, commonly regarded as of Pliocene age or later.*

*In the last few years some of the younger geologists have been asserting that this superficial formation, or most of it at least, is nothing but the weathered portions of the Cretaceous and Tertiary strata; but there are many facts that are not consistent with this hypothesis, and if such a simple explanation was the correct one it would probably have been proposed long ago, and universally accepted by this time.

Of the commoner beneficial mineral ingredients of soils, lime is perhaps about equally common in both divisions, though varying greatly from one subdivision or region to another. The same might be said of phosphorus. Nitrogen and potassium are generally less abundant in the coastal plain soils, except in the "black belt".

On the average the coastal plain is considerably less elevated and less hilly than the hill country. The latter ranges from about 200 to 2,400 feet above sea-level, and the former from sea-level to nearly 1,000 feet. This topographic difference is due partly to the simple fact that the coastal plain is nearer the coast, but partly also to the fact that its rocks are younger and have never become as indurated as some of those in the highlands. The coastal plain exhibits a great variety of topography, perhaps more in Alabama and Mississippi than anywhere else (there being even some small "mountains" near the boundary between these two states), but on the whole its topographic forms are what would be called young. That is to say, most of the streams have not yet carved out wide valleys, and in the more level portions of the area there are many swamps and ponds, which erosion processes are tending slowly but surely (unless other physiographic processes, such as solution of underlying limestone, or warping of the earth's crust, interfere) to do away with.

As the coastal plain, by reason of its position next to the coast, has almost certainly been submerged beneath the sea at a later date than the hill country, its surface is on the average not weathered so deeply, and the vegetation is of a newer, more "pioneer" type. The greater abundance of evergreens in the coastal plain and scarcity of potassium in the soil may be partly due either to this fact, or to the prevalence of summer rains already mentioned, or to both.

THE REGIONS IN DETAIL.

THE HILL COUNTRY—(REGIONS 1-5)

1. The Tennessee Valley.

UNDER this designation is included all that portion of the state north or northwest of the plateau of the coal region (described a little farther on), including not only the main valley of the Tennessee River but also several narrower valleys almost surrounded by portions of the plateau. This region includes quite a number of rather diverse kinds of country, such as the "barrens" adjacent to the Tennessee line, the fertile plains bordering the Tennessee River, the chert ridges in the western half, the limestone slopes bordering the plateau, the Little Mountains of Morgan, Lawrence and Colbert Counties, and Brown's Valley, a direct continuation of the Sequatchie Valley of Tennessee, which extends southwestward into Blount County. Of these the barrens will be described separately, and the rest treated as a unit.

References (for both the Barrens and the Tennessee valley proper). McCalley 1, McCalley 4, Mohr 3 (528-529), Mohr 8 (21-22, 80-89), Smith 4 (9-18, 20-58), Smith 6 (38-44, 69, 109-119), Smith 7 (217-234, 297, 407-433), Smith 9 (10-11, 77-80, 100-107), Tuomey 1 (65-71), Tuomey 2 (1-24, 30-42).

A. The Barrens.
(Figures 1, 2.)

Location, area, and external relations.—This name is applied locally to a strip of country covering about 800 square miles in the northern edge of Lauderdale, Limestone and Madison Counties. It is a part of the "Highland Rim" which surrounds the Ordovician (formerly called Lower Silurian) limestone basin of Middle Tennes-

see. Besides certain references in the papers of McCalley and Smith just cited, the following describe the barrens more particularly:—Mohr 8, p. 88, and the government soil surveys of Lauderdale County and the "Huntsville area".

Geology and soils.—The geological formation of the barrens is mainly the Lauderdale or Keokuk chert, of Lower Carboniferous (Mississippian) age, but the region under consideration is not quite coextensive with that formation. In some places, especially toward the Tennessee line, the larger streams have cut down into the underlying Ordovician limestones. The strata, as in most of the country between the Tennessee River and the Great Lakes, are very nearly horizontal throughout. The soil of the barrens is grayish to yellowish in color, more or less loamy in texture, somewhat more siliceous and much less calcareous than the soils of the Tennessee valley proper, and considered infertile in comparison with them, though it is a considerably richer soil than some in the extreme southern parts of the state which have become very popular in recent years.

Topography and hydrography.—The surface of the barrens is level to undulating, with ravines or gorges along some of the streams which have cut down into the older rocks as above described. In some of the more level areas there are shallow ponds, bearing considerable resemblance in their vegetation and otherwise to those in some parts of the coastal plain. Streams are moderately well developed.

Climate.—There are no weather stations within this region, but the figures for Madison and Florence, a little farther south, show that the average annual temperature must be about 61°, the length of the growing season about 200 days, and the annual rainfall about 49 inches, most of which occurs in the cooler months.

Forest types.—In the more level areas a few feet difference in elevation makes a considerable difference in the amount of water in the soil, and consequently in the vegetation. The drier places have forests of short-leaf pines (the pines in this region seem to be almost confined to Limestone County, though) and various oaks,

much like those of the post-oak flatwoods region to be described later (no. 9); and around the ponds the vegetation is similar to that of some of the Coosa valley flatwoods (region no 4). There are also considerable areas of creek-bottom forests in the more level portions. The gorges along the larger streams are insignificant in area, and have not yet been studied by the writer. They doubtless contain some species not listed below, but their percentages of abundance cannot be very high.

The upland forests are subject to occasional groundfires, which however seem to do little damage.

LIST OF TREES.

20-22	**Pinus Taeda**	Short-leaf pine	Various habitats
9-7	**Pinus echinata**	Short-leaf pine	Driest soils
1-1	**Juniperus Virginiana**	Cedar	
4-2	Hicoria alba?	Hickory	Dry soils
1-1	Hicoria ovata?	Scaly-bark hickory	
1-1	Salix nigra	Willow	Along streams
1-1	Carpinus Caroliniana	Ironwood	Bottoms
1-1	Ostrya Virginiana		Richer soils
0-1	Betula nigra	Birch	Creek banks, etc.
3-4	Fagus grandifolia	Beech	Creek bottoms, etc.
5-3	Quercus alba	White oak	Various habitats
6-5	Quercus stellata	Post oak	Dry soils
2-2	Quercus Michauxii	Swamp chestnut oak	Creek bottoms mostly
12-15	Quercus falcata	Red oak	Dry soils
3-3	Quercus coccinea	Spanish oak	Dry soils
1-1	Quercus Marylandica	Black-jack oak	Dry soils
4-5	Quercus Phellos	Willow oak	Low grounds
1-1	Ulmus Americana?	Elm	Creek bottoms, etc.
2-2	Ulmus alata	Elm	Creek bottoms mostly
6-3	Liriodendron Tulipifera	Poplar	Various habitats
8-10	Liquidambar Styraciflua	Sweet gum	Various habitats
1-2	Platanus occidentalis	Sycamore	Creek banks, etc.
3-4	Acer rubrum	Red maple	Low grounds
1-1	Nyssa sylvatica	Black gum	Various habitats

Assuming the above figures to be correct, it appears that about 30% of the trees, comprising only three species—two pines and a cedar—are evergreen.

Economic features.—The soil of the barrens is so much less fertile than that of the Tennessee valley proper immediately to the south, and the limestone basin just

north, that it has not been in much demand hitherto, and probably 80% of the area is still wooded. The region is being settled up pretty rapidly now though, like many other pine regions in the South. The two pines are probably as abundant there today as they ever were, if not more so; but the amount of white and post oak and hickory must have been considerably diminished to supply the cooperage plants, wagon factories, and other hardwood industries along the Tennessee River.

Cattle seem to have free range in this region, or the greater part of it.

The principal forest products are pine lumber, oak cross-ties, and staves. The large number of cross-ties reported as produced in Lauderdale County in 1912 (see below) must have come partly if not mostly from the barrens. Many white oak logs are shipped to sawmills in other regions or states.

B. Tennessee Valley Proper.
(Figures 3-8.)

This embraces an area of about 4,100 square miles in Alabama, and does not extend very far into any of the adjoining states, without changing its character considerably. References to literature have been given on page 37.

Geology and soils.—In a strip a few miles wide along the southeastern edge of the region, constituting the Brown's-Sequatchie Valley anticline, the strata are mostly Ordovician, Silurian, and Devonian, and much folded and faulted, just as in the Coosa valley, to be described later. In the rest of the area the rocks are all Lower Carboniferous, ranging from Lauderdale chert to Bangor or Mountain limestone, and lie essentially horizontally, as is the case with other Paleozoic strata for many hundred miles northward from Alabama. Interstratified with the Bangor limestone south of the Tennessee River is a sandstone (Hartselle sandstone) varying in thickness from almost nothing to over 300 feet, and closely resembling the sandstone of the region next to be described. Toward the western boundary of the state the

Paleozoic rocks are overlaid by unconsolidated coastal plain strata, whose boundaries are not easily defined. The soils of the valley are various, but red and calcareous clays and loams above the average in fertility predominate in the central portion, with more limestone outcrops eastward and cherty soils westward. Sand is rather scarce.

Topography and hydrography.—Brown's Valley, which the Tennessee River follows from the northeastern corner of the state to Guntersville, contains several low longitudinal chert ridges. The country bordering the river from about the eastern edge of Morgan County to the western edge of Limestone is a wide base-leveled undulating plain (not a flood-plain, however), in which some of the roads and railroads run straight for miles. Toward its eastern end there are several peaks and small plateaus rising above it, capped by sandstone belonging to the next region, which protects the underlying softer limestone from erosion and to a considerable extent from solution by meteoric waters. A few of the smaller peaks near Huntsville have already lost their sandstone caps, and are therefore much farther on the road to complete obliteration than those which are still capped.

In Lauderdale and Colbert Counties there are many chert ridges and limestone (Tuscumbia or St. Louis limestone) bluffs near the river. The Bangor limestone is almost confined to the steep slopes connecting this valley with the sandstone plateau region to be described next, and it is especially noticeable in Jackson County and the eastern part of Madison, where the edges of the plateau have been much dissected by erosion. A prominent feature of Morgan, Lawrence and Colbert Counties is the Little Mountains, an escarpment running approximately east and west, with a steep northern slope rising 300 to 500 feet above the main valley (or 900 to 1,000 feet above sea-level), and a gentle southern slope. This escarpment owes its presence to the Hartselle* sandstone above mentioned.

*Misspelled "Hartsells" by the U. S. Post Office Dept.

On account of the prevalence of limestone in the valley, caves, natural bridges, subterranean streams and large limestone springs are rather common. The springs are found in every county; the most noted are those at Huntsville and Tuscumbia.

The Tennessee River, which touches nearly every county in the region, is a large navigable stream, over half a mile wide in some places. Very few accurate measurements of its fluctuations in Alabama are available, but there are probably places where it rises as much as 50 feet. Its water is very muddy in spring, but greenish in late fall or whenever it is near its lowest stage, the green color presumably resulting from a mixture of the blue characteristic of limestone streams with yellow clay in suspension. Mussel† Shoals, in Lauderdale, Colbert and Lawrence Counties, is a noteworthy feature of this great river. There the river falls 85 feet in about 15 miles, over strata of the Lauderdale chert, and is very wide and dotted with numerous islands. Opposite Decatur and at a few other places along the more sluggish portion of the river it is bordered by swamps and sloughs something like those along some coastal plain rivers.

In Brown's Valley the streams, including the Tennessee itself, all run lengthwise of the valley, except in Blount County, where they run out of it into the adjoining coal region, as do some of those in the Coosa valley region.

Climate.—Climatic data for the Tennessee valley can be found in the appendix, under the stations Madison, Decatur and Florence. The winters are damp and the summers dry, as a rule, which together with the fluctuations of the Tennessee River must cause considerable seasonal variations in the ground-water level, and facilitate the natural processes of soil formation.

Forest types.—The forest types of this region are as diversified as the topography. It is difficult to reconstruct in the mind's eye the original forests of the fertile plain bordering the river, but they must have been large-

†Often misspelled "Muscle."

ly of the oak-hickory type. The limestone slopes support a great variety of hardwoods, and these forests have been comparatively little disturbed, because the ground is mostly too steep and rocky for agricultural purposes. The chert ridges, the Little Mountains, and the bottoms, banks and bluffs of the Tennessee River all have their characteristic trees.

Fires are too rare to be of any importance in this region, originally because of the rapid humification of the fallen leaves, and now also because of the discontinuity of the forests.

LIST OF TREES.

3-4	**Pinus Taeda**	Short-leaf pine	Hartselle sandstone, etc.
1-2	**Pinus echinata**	Short-leaf pine	Driest soils
1-2	**Pinus Virginiana**		Chert ridges mostly
0-0	Taxodium distichum	Cypress	Along creeks west of Florence
10-15	**Juniperus Virginiana**	Cedar	Limestone slopes mostly
3-2	Juglans nigra	(Black) walnut	Richest soils
5-4	Hicoria ovata	Scaly bark hickory	Rich woods
2-1	Hicoria alba	Hickory	Dry woods
1-1	Hicoria glabra	Hickory	Dry woods
0-0	Hicoria minima	Bitternut hickory	River banks
2-4	Salix nigra	Willow	Banks of streams
0-0	Populus deltoides	Cottonwood	River banks
0-0	Carpinus Caroliniana	Ironwood	Bottoms
0-0	Ostrya Virginiana		
1-2	Betula nigra	Birch	Banks of creeks and rivers
6-4	Fagus grandifolia	Beech	Rich woods
2-1	Castanea dentata	Chestnut	Chert ridges, etc.
4-2	Quercus alba	White oak	Various habitats
3-2	Quercus stellata	Post oak	Dry non-calcareous soils
0-1	Quercus Prinus	Chestnut oak	Non-calcareous ridges
2-3	Quercus Muhlenbergii		Calcareous soils
0-1	Quercus Michauxii	Swamp chestnut oak	Bottoms
4-4	Quercus falcata	Red oak	Dry soils
0-0	Quercus velutina		Non-calcareous ridges
0-0	Quercus rubra		
1-0	Quercus coccinea	Spanish oak	Dry soils
2-2	Quercus Schneckii		Calcareous soils
1-1	Quercus Marylandica	Black-jack oak	Driest soils
2-2	Quercus nigra	Water oak	Low grounds
2-3	Quercus Phellos	Willow oak	Flatwoods and bottoms
3-2	Ulmus Americana	Elm	Rich soils

LIST OF TREES—Continued.

3-2	Ulmus alata	Elm	Flatwoods, etc.
1-0	Ulmus fulva	Slippery elm	Richest soils
0-0	Planera aquatica		River banks below Florence
2-2	Celtis occidentalis	Hackberry	River-banks, etc.
1-0	Morus rubra	Mulberry	Rich soils
3-2	Liriodendron Tulipifera	Poplar	Various habitats
2-1	Sassafras variifolium	Sassafras	
6-5	Liquidambar Styraciflua	Sweet gum	Various habitats
3-4	Platanus occidentalis	Sycamore	Banks of streams
0-0	Amelanchier sp.	Service-berry	
0-0	Crataegus viridis	(Red) haw	Bottoms
0-0	Prunus Americana	Wild plum	Rich soils
0-0	Prunus umbellata	Hog plum, sloe	
1-0	Prunus serotina	Wild cherry	
1-1	Cercis Canadensis	Redbud	Calcareous soils mostly
0-1	Gleditschia triacanthos	Honey locust	Calcareous soils mostly
1-0	Robinia Pseudacacia	Black locust	Mountain slopes mostly
0-1	Cotinus Americanus	Chittamwood	Limestone slopes only
0-0	Ilex opaca	Holly	
0-0	Acer Saccharum?	Sugar maple	Rich woods
1-2	Acer saccharinum	Silver maple	Muddy river banks
2-3	Acer rubrum	Red maple	Along smallest streams, etc.
0-1	Acer Negundo		River-banks, etc.
1-0	Aesculus octandra	Buckeye	Richest soils
1-0	Tilia sp.	Basswood, lin	Rich woods
2-2	Cornus florida	Dogwood	Dry woods
2-2	Nyssa sylvatica	Black gum	Poorer soils mostly
0-1	Nyssa uniflora	Tupelo gum	Sloughs near Tennessee River
0-0	Oxydendron arboreum	Sourwood	Non-calcareous ridges
0-0	Bumelia lycioides		Limestone outcrops, etc.
0-1	Diospyros Virginiana	Persimmon	Various habitats
0-0	Halesia Carolina		
3-1	Fraxinus Americana	Ash	Rich soils
0-0	Viburnum rufidulum	Black haw	Dry woods

A noteworthy feature of this list is the large number of trees in it which have durable dark-colored heartwood. Among them are the cedar, walnut, mulberry, sassafras, cherry, redbud, black locust and chittamwood, and several others show the same character in lesser degree. The last-named (*Cotinus Americanus,* also known as *Rhus cotinoides*) is one of the rarest small trees in the United States, and is not known in any other part of Alabama. It has been found at several different places in this region, but all within a few miles of the Huntsville meridian. The honey locust (*Gleditschia*)

does not seem to be indigenous in any other part of the state, though it grows along roadsides, in pastures, etc., in several other regions.

This is one of the few divisions of Alabama which has no long-leaf pine and apparently no species of *Magnolia*. Evergreens are scarcer here than in any other region, with one exception, having constituted only about 16% of the original forests if the above figures are correct. Most of the evergreens are of a single species, the cedar, which although it is being cut more than any other tree in the region, is relatively more abundant now than it was originally, because it is chiefly confined to rocky slopes unsuited to agriculture. (The vast forests which have disappeared from the more level and easily tilled areas presumably consisted almost entirely of deciduous trees.)

Population, percentage of woodland, etc.—In 1910 the density of population in the Tennessee valley proper was about 53 persons to the square mile, an increase of 11% since 1900. This comparatively small increase is characteristic of many other parts of the United States where agriculture is the dominant industry and where the density of population has already passed 40 per square mile. About two-thirds of the inhabitants are white. Probably not more than 40% of the area is at present wooded, and the remaining forest is chiefly confined to rocky slopes and wet bottoms, which would be difficult to cultivate. There is little or no free range for cattle.

Forest products.—The Tennessee valley is pre-eminently the hardwood region of the state (as already indicated by the small percentage of evergreens), and it still supports a great variety of wood-manufacturing industries. About 10% of the manufacturers listed by Harris and Maxwell in their paper on the wood-using industries of Alabama are located in this region. The principal forest products, in approximate order of total value, seem to be as follows:

Cedar posts, poles, and pencil-wood.
Cooperage stock of various kinds, both tight and slack.
Cross-ties from various species of oak.
Crates and baskets.

Spokes, handles, hubs.
Wagons, furniture.
Columns and pump-logs.
Shingles.
Boats.
Shuttles.
Hickory fiber for street brooms.
Locust pins.
Sporting goods.
Charcoal (less now than formerly).
Butter trays.
Walnuts and hickory nuts.
Medicine from barks, roots, etc.
Sassafras oil.

The Southern Lumberman's directory lists 48 sawmills from this region, with an average capacity of 9,250 feet a day, and 19 other wood-working establishments. This is a larger number of mills in proportion to the remaining area of fores than any other region has. The two largest mills in the region have a daily capacity of 30,000 feet each. One of these, at Falkville, operates 6½ miles of tram-road, or logging railroad.

These mills cut a greater variety of timber than those of any other division of the state, too. Five of them claim to cut long-leaf pine and two white pine, but the supposed long-leaf pine is probably mostly *Pinus Taeda* and the white perhaps *P. Virginiana*. Eighteen mills cut short-leaf pine, 9 cedar, 7 walnut, 24 hickory, 2 birch, 13 beech, 9 chestnut, 38 white oak, 40 red oak (these names doubtless cover several species of oak, as explained on page 33), 12 elm, 3 hackberry, 3 cucumber (probably obtained from some region farther south), 34 poplar, 16 "red" (sweet) gum, 7 sycamore, 5 cherry, 6 basswood (lin), 5 maple, 4 tupelo gum, and 23 ash, not to mention several other woods reported by only one mill each. No statistics of the relative amount of each of these woods cut in the region are available, but for most of them some figures covering the whole state can be found in Appendix E.

Pencil-wood mills are located in Jackson County and the eastern part of Madison, where the cedar seems most abundant at present, and at Decatur, and much of their product is shipped to England and Germany for the use of the well-known pencil-makers there. A news item

sent out from Florence to the state newspapers on Oct. 26, 1912, stated that the river bank was lined with white oak and red oak cross-ties from there to the west end of the county, and the value of the year's output from that county alone was estimated at $125,000 (which would mean enough for over 100 miles of railroad). Decatur seems to be the greatest center of hardwood manufactures in the state, in proportion to population at least. Quite a number of wood-working industries are located also at Bridgeport, Huntsville, Florence and Sheffield.

2. The Coal Region.

This includes all those parts of the state where the country rock is Coal Measures (Carboniferous proper, or Pennsylvanian). It can be divided for convenience, though not very sharply, into two subdivisions, the plateau region and the basin region. The line of separation between them corresponds approximately with the northern boundary of Walker and Jefferson Counties.

A. The Plateau Region.

(Figures 9-13.)

This sub-region includes all the Coal Measures north of the Tennessee River (i. e., the spurs of the Cumberland Mountains in Madison and Jackson Counties), the main body of similar rocks down to the line named in the preceding paragraph, commonly called Sand Mountain, and two isolated plateaus a little farther east, Chandler Mountain and Lookout Mountain. It is a continuation of the Cumberland Plateau of Kentucky, East Tennessee and Northwest Georgia, and covers about 3,100 square miles in Alabama.

References.—Harbison, Harper 2, Harper 3, McCalley 2 (5, 16-40, 52-75, 81-96), McCalley 3 (15-218), Mohr 5 (89, 110), Mohr 6 (95, 118), Mohr 7, Mohr 8 (20, 69-80), Smith 4 (59-60, 97-104), Smith 6 (36, 37, 68-69, 103-106, 108-110, 120), Smith 7 (213-214, 217, 296, 390-398, 404-411, 438), Smith 9 (9-10), Toumey 2 (160-161).

Geology and soils.—The geology is very simple, the rocks being of the lowest Coal Measures, nearly all sandstone (a little shale), and the strata very little disturbed by faults, folds, or tilting. Toward the western edge the Coal Measures dip beneath the unconsolidated formations of the coastal plain so gradually as to make the boundary between the two on the surface very intricate, as explained in the introductory part of this report (page 21). The soil is nearly all sandy loam, derived from sandstone by weathering, and its prevailing color is yellowish gray or pale buff. It is rather deficient in lime and phosphorus, but pretty well supplied with other elements of fertility, and has the advantage of being easily tilled, and responding readily to fertilization.

Topography and hydrography.—The greater part of the plateau stands pretty high—in some places nearly 1,000 feet—above the valleys on either side of it (having a maximum elevation in Alabama of about 1,800 feet above sea-level), but its topography is of the kind called immature by geomorphologists. The smaller streams have not yet excavated their valleys much, while the larger ones, especially toward the edges of the plateau, have cut deep narrow rocky gorges, making some of the most picturesque scenery imaginable, for a country that can hardly be called mountainous. With very few exceptions the streams of this region originate on the plateau and flow off into the surrounding valley regions and coastal plain, and they are mostly small, swift, clear, and not subject to much fluctuation.

In Winston and Marion Counties and to some extent in those adjoining there are many examples of a peculiar type of topography known as "rock-houses."* As one ascends a ravine he will often find at its head a massive overhanging ledge of sandstone with its upper edge horizontal and either straight or concave. A small stream usually tumbles over the ledge in wet weather, while at all seasons there is likely to be water dripping

*For additional descriptions of this sort of topographic feature see McCalley 2 (17-18, 54), Smith 4 (98-99), Smith 6 (108), Smith 7 (405), and Mohr 8 (75-76).

from crevices on its under side, and often a few small springs at its base as well. Some of the ledges overhang so far that part of the roof of the "house" back of the edge has become loosened by the action of water on joint-planes and fallen in, leaving the outer edge as a natural bridge. A beautiful example of this can be seen near Natural Bridge station in Winston County. The bridge there has a span of about 80 feet and a width of about 20, and is of very graceful proportions, being a very flat arch with a thickness of only three or four feet in the middle. (See figure 10.)

Climate.—None of the present weather stations within this region have been established long enough to give accurate climatic data, but the climate of the plateau probably does not differ much from that of the Tennessee valley, in average annual temperature at least. On account of its elevated position it may be a little more exempt from early and late frosts, and thus have a slightly longer growing season.

Forest types.—The principal forest type of the plateau region is the dry oak and pine woods of the comparatively level loamy uplands. Much more limited in extent, but perhaps equally rich in species, are the richer woods of ravines and bluffs, sufficiently protected from fire and evaporation for the growth of beech, sweet gum, poplar, etc., and the swamps and banks of creeks and branches. Fire is moderately frequent in the level open woods, especially in the limited areas where long-leaf pine grows.

LIST OF TREES.

1-1	**Pinus palustris**	Long-leaf pine	Poorest soils
12-16	**Pinus Taeda**	Short-leaf pine or swamp pine	Generally distributed
8-10	**Pinus echinata**	Short-leaf pine	Driest soils
3-4	**Pinus Virginiana**	Cliff pine	Rocky places
1-1	**Tsuga Canadensis**	Spruce pine or hemlock	Ravines
1-1	**Juniperus Virginiana**	Cedar	Rocky places
0-0	Hicoria ovata	Scaly-bark hickory	Richer soils
3-2	Hicoria alba	Hickory	Dry woods
2-1	Hicoria glabra	(Pignut) hickory	Dry woods

LIST OF TREES—Continued.

0-1	Salix nigra	Willow	Along creeks
0-1	Carpinus Caroliniana	Ironwood	Along creeks mostly
0-0	Ostrya Virginiana		Ravines and bluffs
0-0	Betula nigra	Birch	Along creeks
0-0	Betula lenta	Birch	Exposed cliffs
3-3	Fagus grandifolia	Beech	Richer soils
4-2	Castanea dentata	Chestnut	Dry woods
0-0	Castanea pumila	Chinquapin	Dry woods
6-4	Quercus alba	White oak	Richer soils
7-5	Quercus stellata	Post oak	Dry woods
4-4	Quercus Prinus	Chestnut oak	Dry or rocky places
2-4	Quercus falcata	Red oak	Dry woods
3-3	Quercus velutina	Black oak	Dry woods
1-1	Quercus rubra		
3-3	Quercus coccinea	Spanish oak	Dry woods
2-3	Quercus Marylandica	Black-jack oak	Driest soils
0-1	Quercus nigra	Water oak	Along creeks mostly
1-1	Magnolia glauca	Bay	Along branches
0-0	Magnolia tripetala	Cucumber tree	Ravines
1-1	Magnolia macrophylla	Cucumber tree	Ravines
6-4	Liriodendron Tulipifera	Poplar	Generally distributed
0-0	Sassafras variifolium	Sassafras	
3-4	Liquidambar Styraciflua	Sweet gum	Richer soils
0-1	Platanus occidentalis	Sycamore	Along creeks
0-0	Amelanchier sp.	Service-berry	
0-0	Malus angustifolia	Crab-apple	
0-0	Cercis Canadensis	Redbud	
2-1	Robinia Pseudacacia	Black locust	Bluffs mostly
2-2	Ilex opaca	Holly	Ravines, etc.
0-0	Acer leucoderme	Sugar maple	
4-5	Acer rubrum	Red maple	Along branches mostly
0-0	Tilia sp.	Lin, basswood	Richer soils
4-4	Cornus florida	Dogwood	Dry woods
3-2	Nyssa sylvatica	Black gum	Various habitats
0-0	Nyssa biflora?	Black gum	Along branches
2-2	Oxydendron arboreum	Sourwood	Various habitats
0-0	Halesia Carolina		Rich woods
1-1	Symplocos tinctoria	Sweet-leaf	Ravines, etc.
0-0	Viburnum rufidulum	Black haw	

There is a marked difference between this list of trees and that for the Tennessee valley, especially when the percentages of abundance are taken into consideration. It is interesting to note that some of the trees that grow on the poorest soils in the valley are common on the plateau, and some of those common in the valley are confined to the richest soils on the plateau, all of which is

easily explained. About 29% of the trees in the primeval forests of the plateau were evergreen. Besides the conifers (the first six species on the list) the other evergreens are the bay and holly. The water-oak and sweet-leaf are semi-evergreens.

Population, amount of woodland, etc.—In 1910 the plateau region had about 30 inhabitants to the square mile, an increase of about 37% in ten years. This region has by far the largest proportion of white people of any part of the state, namely, about 98%.

About 75% of the area is estimated to be still wooded, and consequently open range for stock is the rule in most parts. Now that the richer soils of the neighboring valleys are nearly all occupied by farmers the once despised sandy lands of the plateau are being utilized more and more, and for the last quarter of a century or so the agricultural population has been increasing here more rapidly than in any other equal area in northern Alabama. (The greater percentages of increase shown by some counties a little farther south are due more to mining and manufacturing than to farming.)

All the commoner trees have probably suffered about equally from farming and lumbering operations, but some of the pines have spread considerably in abandoned clearings, and thus increased in relative abundance. Before there was much farming done in this region large areas are said to have been denuded of their best timber to make charcoal for the iron furnaces in the valleys, but that practice is now on the wane, coke being used much more than charcoal. A great deal of timber has been consumed also for props in the numerous coal mines in the region, and of course for cross-ties on the railroads.

No navigable river traverses this region, but the Tennessee approaches it closely in Jackson and Marshall Counties, and furnishes an outlet for some of its products. Railroads are not very numerous as yet, largely because the abrupt edges of the plateau are too difficult for them to climb in many places. Some points in the region are at present 20 miles from a railroad.

The principal forest products seem to be as follows:

Short-leaf pine lumber.
Post-oak and chestnut cross-ties.
Fuel and charcoal.
Chestnut poles and posts.
Mine timbers.
Staves, handles, furniture.
Chestnut oak tanbark.
Chestnut wood for tanning extract.
Chestnuts and hickory nuts.

The Southern Lumberman lists 21 sawmills from this region, with an average daily capacity of 6,300 feet. The largest cuts only 15,000 feet a day. With over 7% of the total standing timber of the state, the plateau region seems to be producing only a little over 1% of the state's preset output of lumber. Even if the enumeration is incomplete, with the possible exception of two regions less than 1,000 square miles in extent, this one seems to have the fewest mills in proportion to the amount of woodland, the smallest average capacity per mill, and the smallest total output in proportion to the area and the number of inhabitants. All this is probably due mainly to the topography, which hinders the building of railroads. Evidently this region contains a large reserve supply of timber for future use.

Five of the mills claim to cut long-leaf pine, but this may be an exaggeration, as was intimated in the case of the Tennessee valley. Ten of them cut short-leaf pine (which includes two or three species), 5 hickory, 2 beech, 2 chestnut, 13 white oak, 11 red oak, 11 poplar, and 2 sweet gum.

B. The basin region.

(Figures 14, 15.)

This includes the remainder of the Alabama coal fields, comprising the Warrior field proper and the Cahaba and Coosa coal fields a little to the southeast of it. The area thus defined covers about 3,300 square miles. It has no exact counterpart in nay adjoining state, but a good deal of the coal region of Pennsylvania and West Virginia has very similar topography.

References.—Harper 1, McCalley 2 (5-6, 109-124, 128-542), McCalley 3 (218-225), Mohr 8 (20, 90-93), Smith 4 (60-95, 105-109), Smith 6 (36-37, 106-108, 123), Smith 7 (212, 214-215, 399-404, 445-448), Tuomey 1 (81-93).

Geology and soils.—The sandstones of the plateau just described dip southwestward, and in the basin region are covered deeply in most places with newer strata, still belonging to the Coal Measures. Although some pretty thick beds of sandstone are found in the basin, the rocks are as a rule shaly; and there are also a few thin beds of limestone and of iron ore, according to McCalley, as well as many coal seams of varying thickness. In a few places near the southeastern edge of the Warrior basin and in the Cahaba and Coosa fields the strata are considerably crumpled and faulted, but elsewhere they are nearly horizontal.

No analyses of soils in the basin region seem to be available, but they are more clayey as a rule than those of the plateau, though perhaps not any more fertile, on the uplands at least. Agricultural operations are chiefly confined to bottom-lands.

Topography and hydrography.—Erosion has progressed much farther here than in the plateau region, partly because the rocks are softer, and perhaps also for other reasons, and the topography is what would be called mature, or even old in some parts. There is little level land on the uplands, and many of the creeks flow through rather wide flat-bottomed valleys bordered by bluffs. The railroads and settlements are mostly in the valleys, instead of on the uplands as they are in the plateau region. There are few steep bare cliffs in the basin region, the bluffs formed by erosion being mostly well rounded in outline, and densely wooded. Waterfalls and natural bridges are scarce. The smallest streams usually head in rich ravines which are dry a large part of the time. There are no big springs or subterranean streams. The smaller creeks dry up in summer, and the larger ones and the rivers are usually somewhat turbid, and have considerable seasonal fluctuation. A few have their sources in limestone valleys belonging to the next

region, and when the water is low enough the influence of the limestone in such streams is perceptible.*

Climate.—Judging from the records for Cordova, which is pretty centrally located in the basin region, the average temperature is about 61°, the rainfall 53 inches, and the summers a little drier than the winters. The autumn months are the driest, as in most other parts of the eastern United States.

Forest types.—The forest types can be correlated pretty closely with the topography. There are dry oak and pine woods on the uplands or ridges, dense thickets of cliff pine on the brows of many of the bluffs, a considerable variety of trees on the lower slopes of the same bluffs and in ravines, and still other kinds in the valley bottoms and on the banks of rivers.

In the northeastern half of Walker County, and extending a short distance into Winston and Jefferson, there is, or has been, a splendid long-leaf pine forest covering part of several townships, remarkably similar in appearance to some of the open pine forests within 100 miles of the coast. (See figure 14.)† Although not very far from the coastal plain, its presence does not seem to be correlated with any outlying patch of coastal plain deposits, for the soil is apparently nothing but a residual sandy loam derived from the Coal Measures, and does not differ materially from that of the plateau region.

On the shale bluffs of the Warrior River in Tuscaloosa County one finds a remarkable number of trees and shrubs belonging to species that are commonly supposed to be lime-loving; but a recent analysis of a typical specimen of the rock showed only 0.42% of lime (computed as CaO). The percentage of potash (K_2O) was much higher, 3.95%, and may possibly be the significant factor in this case.

Fire is less frequent in the basin than on the plateau, no doubt chiefly on account of the more broken topo-

*On Oct. 16, 1911, the Locust Fork of the Warrior River near Palos, Jefferson Co., looked as blue as the outlet of a large limestone spring.

†For additional information about this isolated area of long-leaf pine see McCalley 2 (58, 129), Mohr 5 or 6 (42), Mohr 8 (91), Smith 6 (108), Smith 7 (404); especially the first-named.

graphy, which limits the spread of fire. This is pretty well illustrated by the manner of growth of the cliff pine, a thin-barked tree very sensitive to fire. As stated above, it forms thickets on the brows of bluffs. Fire rarely originates in the bottoms and travels up the bluffs, and a forest fire starting on the upland and coming to the top of a bluff would run down hill very slowly, if at all.

LIST OF TREES.

5-4	Pinus palustris	Long-leaf pine	Poorest soils
15-20	Pinus Taeda	Short-leaf pine	Nearly everywhere
6-6	Pinus echinata	Short-leaf pine	Dry uplands
5-7	Pinus Virginiana	Cliff pine	Dry bluffs
1-1	Juniperus Virginiana	Cedar	Dry cliffs
0-0	Juglans nigra	Black walnut	Rich soils
2-1	Hicoria alba	Hickory	Dry woods
1-1	Hicoria glabra	(Pignut) hickory	Dry woods
1-2	Salix nigra	Willow	Creek banks, etc.
1-1	Carpinus Caroliniana	Ironwood	Bottoms mostly
2-1	Ostrya Virginiana		Bluffs, etc.
1-1	Betula nigra	Birch	Along creeks and rivers
6-5	Fagus grandifolia	Beech	Ravines and bluffs
0-0	Castanea dentata	Chestnut	
5-4	Quercus alba	White oak	Various habitats
4-3	Quercus stellata	Post oak	Dry soils
0-0	Quercus Durandii		Bluffs on Warrior River
2-2	Quercus Prinus	Chestnut oak	Dry bluffs, etc.
1-1	Quercus Muhlenbergii		Bluffs near Warrior Riv
2-1	Quercus Michauxii	Swamp chestnut oak	Bottoms, etc.
3-4	Quercus falcata	Red oak	Dry soils
1-1	Quercus velutina	Black oak	Dry soils
0-0	Quercus rubra		Ravines, etc.
1-1	Quercus coccinea	Spanish oak	Dry woods
2-2	Quercus Marylandica	Black-jack oak	Driest soils
0-0	Quercus cinerea		Poorest soils
2-2	Quercus nigra	Water oak	Low grounds mostly
0-0	Quercus laurifolia		Along Warrior Riv.,etc.
1-1	Quercus Phellos	Willow oak	Bottoms, etc.
0-0	Ulmus Americana	Elm	Bottoms, etc.
1-1	Ulmus alata	Elm	Bluffs, etc.
0-0	Ulmus fulva	Slippery elm	Richest soils
0-0	Ulmus serotina	Elm	Rich bluffs
0-0	Celtis occidentalis	Hackberry	River-banks
1-1	Morus rubra	Mulberry	Bottoms and bluffs
1-1	Magnolia glauca	Bay	Along branches
0-0	Magnolia acuminata	Cucumber tree	Ravines and bluffs
1-1	Magnolia macrophylla	Cucumber tree	Ravines and bluffs
4-3	Liriodendron Tulipifera	Poplar	Ravines mostly

LIST OF TREES—Continued.

0-0	Asimina triloba	Pawpaw	Rich bottoms
0-0	Sassafas variifolium	Sassafras	
3-4	Liquidambar Styraciflua	Sweet gum	Widely distributed
1-2	Platanus occidentalis	Sycamore	Along creeks and rivers
0-0	Amelanchier Canadensis	Service berry	Bluffs, etc.
0-0	Crataegus spathulata	Haw	Dry woods
0-0	Prunus Americana	Wild plum	Rich woods
0-0	Prunus serotina	Wild cherry	Ravines, etc.
0-0	Prunus Caroliniana	Mock orange	Ravines, Tuscaloosa Co.
0-0	Cercis Canadensis	Redbud	Rich woods
0-0	Cladrastis lutea	Yellow-wood	Bluffs on Warrior River
1-1	Ilex opaca	Holly	Ravines, etc.
0-0	Ilex decidua		Bottoms.
0-0	Acer Saccharum?	Sugar maple	Ravines and bluffs
1-1	Acer leucoderme	Sugar maple	Ravines and bluffs
3-4	Acer rubrum	Red maple	Along branches
0-0	Acer Negundo		River banks, etc.
1-1	Tilia heterophylla?	Lin, basswood	Rich woods
3-3	Cornus florida	Dogwood	Dry woods
2-1	Nyssa sylvatica	Black gum	Various habitats
0-0	Nyssa biflora	Black gum	Along branches
1-1	Oxydendron arboreum	Sourwood	Bluffs, etc.
0-0	Bumelia lycioides		Bluffs of Warrior River
0-0	Diospyros Virginiana	Persimmon	Old fields mostly
2-1	Fraxinus Americana	Ash	Rich woods
0-0	Fraxinus quadrangulata	Ash	Bluffs of Warrior River
1-1	Viburnum rufidulum	Black haw	Bluffs, etc.

About 34% of the trees in the original forests seem to have been evergreen. There are represented here fifteen species of oak, which together make up nearly one-fourth of the forest growth.

Population, amount of woodland, etc.—The coal basin region had in 1910 about 40 inhabitants to the square mile, an increase of 38% since 1900. About 70% of them are white. But there are probably nearly as many miners as farmers in the region,* and about 80% of the

*In Walker and Jefferson Counties, excluding the cities of Birmingham and Bessemer (which are in the Coosa valley region and probably number very few coal miners among their citizens) there were in 1910, according to the census, 33,095 adult male inhabitants. The number of men employed in or around coal mines in the same two counties, according to reports of the state mine inspector, was 14,443 in 1909 and 15,168 in 1911. Even if some of the miners are not adults, if the merchants, railroad men, iron miners, etc., were deducted from the total adult male population it would doubtless leave the farmers less numerous than coal miners in the areas named.

area seems to be still wooded. Cattle have open range in all or nearly all the counties. The bottom-land trees have suffered most from agricultural operations, as already indicated, in which this region differs from most other parts of the state.

None of the rivers are naturally navigable, but the Warrior is being gradually made so by the construction of locks. The region is fairly well supplied with railroads.

Forest products.—The Southern Lumberman lists 21 sawmills from this region, with an average capacity of 12,900 feet a day. Thirteen of these mills claim to cut long-leaf pine, 14 short-leaf, 2 white pine (*Pinus Virginiana?*), 11 white oak, 9 red oak, and 9 poplar. The long-leaf pine mills are mostly in Walker and Tuscaloosa Counties. The largest one, which is at Manchester, Walker County, operates 15 miles of railroad and can saw 60,000 feet of lumber a day. The relatively small development of the lumber industry in this well-wooded region is doubtless due partly to the topography, but perhaps also to the fact that coal mining is the greatest industry, and much timber is used for mine props, etc., without going through a sawmill. A good deal has also been consumed in the form of charcoal for the iron furnaces in neighboring regions.

Other forest products besides lumber are post oak cross-ties, white oak cooperage stock, and naval stores (i. e., rosin and turpentine, from long-leaf pine), the last not being made farther north than Tuscaloosa County.

3. Coosa (Appalachian) Valley Region.
(Figures 16-18.)

This is the southwestern end of the great Appalachian valley, which lies between the coal region and the Blue Ridge and is over 1,000 miles long, the other end of it being in Pennsylvania. In Alabama it comprises the valley of the Coosa River from the Georgia line to the northern border of Chilton County, and several narrower valleys of similar geological formation lying a little to the northwestward and parallel to it, such as Wills's, Murphree's, Roup's, Jones's, Shades and Cahaba; in all about 4,000 square miles.

References.—McCalley 5, Mohr 3 (529), Mohr 5 or 6 (41-42), Mohr 8 (21, 67-68), Smith 2 (83-183), Smith 3 (9-39), Smith 6 (27-35, 95-102, 105-107), Smith 7 (190-210, 368-389, 396-402), Smith 9 (7-9, 71-77, 81-87), Tuomey 1 (8-29), Tuomey 2 (27-29, 79-93).

Geology and soils.—The rocks of the Coosa valley region are mostly Cambrian, Ordovician and Silurian. Strips of Devonian and Lower Carboniferous, mostly too narrow to show on a state map, crop out along the edges of the coal region. The strata are nearly everywhere folded and faulted in a complex manner, but with a general northeast-southwest strike, as already noticed in Brown's Valley. The soils are very diverse in color, texture and fertility. The principal varieties are residual gray, yellow and red clay, shale and chert. The Upper Silurian sandstone ridges, such as Red Mountain, have thin sandy soils much like those of the plateau region already described, but deep beds of sand are rare or wanting, as in the Tennessee valley. There are many limestone outcrops of various ages in the valleys and on mountain slopes. Some of the streams are bordered by more or less alluvial soil.

Topography and hydrography.—The topography is about as varied as the geology, and closely correlated with it. A prominent feature of this region, as of the whole Appalachian valley, is long parallel ridges with broad base-leveled valleys between them; a decidedly ma-

ture topography. Streams are pretty numerous, but many of the smaller ones now run through cultivated fields, where they have eroded their channels several feet below the general level as a result of the lowering of the ground-water level by deforestation, and they are also dry part of the time. The larger ones become muddy and rise several to many feet in the rainy season (winter and spring). The Coosa River, as far down as the point where it leaves Etowah County and becomes a county boundary, is a sluggish navigable stream with very sinuous meanders, rising and falling about 25 feet during an average year. Below that point it is shallower, swifter, and straighter, and not naturally navigable, but navigation has been extended down it some distance by means of locks.

Large springs, caves and subterranean streams are much less frequent in the Coosa valley than in that of the Tennessee, but small springs are common. Swamps are almost unknown. In the narrower side valleys, except Wills's, the streams do not run lengthwise of them for any considerable distance, but soon turn aside into the coal regions, which in many places are actually lower, beyond their elevated rims, than the valleys. In Wills's Valley the size of the streams is limited in another way. The divide between the Tennessee and Coosa Rivers crosses this valley near Valley Head, and it is only about 50 miles from there to the south end of the valley; too short a distance to form a river.

Climate.—Records from two weather stations in this region, Gadsden and Talladega, will be found in the subjoined table. The average temperature is about 63°, and the growing season about 210 days. The summer and fall are rather dry, as in the Tennessee valley.

Forest types.—These are closely connected with the topography and soil, and are too numerous to be described in detail here. Near the Coosa River all the way through the region the chert ridges and even some of the more level areas were originally covered with splendid forests of long-leaf pine, intermingled with various oaks and a small proportion of short-leaf pine. The vegetation of the sandstone ridges is somewhat similar, ex-

cept that the proportion of long-leaf pine is less. Hardwoods prevail in the narrower valleys, especially in the flatwoods near the southwestern end of Jones's Valley, in Jefferson County. Still other types of forest clothe the mountain slopes and ravines, or follow the banks of streams.

Fire is frequent in the long-leaf pine forests, less so elsewhere, especially in the flatwoods and bottoms, where it is rare or unknown.

LIST OF TREES.

10-8	**Pinus palustris**	Long-leaf pine	Poorest soils
15-20	**Pinus Taeda**	Short-leaf pine	Nearly everywhere
7-6	**Pinus echinata**	Short-leaf pine	Dry soils
2-2	**Pinus Virginiana**		Rocky hills
4-2	**Juniperus Virginiana**	Cedar	Limestone outcrops mostly
1-0	Juglans nigra	Black walnut	Rich soils
1-1	Hicoria ovata	Scaly-bark hickory	Flatwoods, etc.
2-1	Hicoria alba	Hickory	Dry woods
1-1	Hicoria glabra	(Pignut) hickory	Dry woods
0-0	Hicoria microcarpa?	Hickory	Chert ridges
1-2	Salix nigra	Willow	Banks of streams
0-0	Populus deltoides	Cottonwood	River-banks
1-1	Carpinus Caroliniana	Ironwood	Near streams
1-1	Ostrya Virginiana		Rich woods
0-1	Betula nigra	Birch	Along creeks and rivers
2-2	Fagus grandifolia	Beech	Rich woods
2-1	Castanea dentata	Chestnut	Ridges mostly
5-3	Quercus alba	White oak	Various habitats
6-4	Quercus stellata	Post oak	Dry soils
0-0	Quercus lyrata		Bottoms
1-1	Quercus Prinus	Chestnut oak	Rocky ridges
0-0	Quercus Muhlenbergii		Calcareous soils
1-1	Quercus Michauxii	Swamp-chestnut oak	Bottoms
3-4	Quercus falcata	Red oak	Dry soils
0-0	Quercus pagodaefolia		Flatwoods and bottoms
0-0	Quercus velutina	Black oak	Dry soils
0-0	Quercus rubra		
0-0	Quercus Schneckii		Flatwoods
1-1	Quercus coccinea	Spanish oak	Dry woods
3-4	Quercus Marylandica	Black-jack oak	Driest soils
2-3	Quercus nigra	Water oak	Low grounds
0-0	Quercus laurifolia		
3-3	Quercus Phellos	Willow oak	Flatwoods, etc.

LIST OF TREES—Continued.

0-0	Ulmus Americana	Elm	Low grounds
2-2	Ulmus alata	Elm	Flatwoods, etc.
0-0	Ulmus fulva	Slippery elm	Calcareous soils
0-0	Celtis occidentalis	Hackberry	Banks of streams
1-0	Morus rubra	Mulberry	Rich soils
1-1	Magnolia glauca	Bay	Along branches
0-0	Magnolia macrophylla	Cucumber tree	Bluffs, etc.
4-3	Liriodendron Tulipifera	Poplar	Various habitats
0-0	Asimina triloba	Pawpaw	Bottoms
1-1	Sassafras variifolium	Sassafras	
4-6	Liquidambar Styraciflua	Sweet gum	Various habitats
1-2	Platanus occidentalis	Sycamore	Banks of streams
0-0	Malus angustifolia	Crab-apple	Flatwoods, etc.
0-0	Crataegus spathulata	Haw	Dry woods
0-0	Crataegus viridis	Haw	Bottoms
0-0	Prunus Americana	Wild plum	Calcareous soils
1-1	Cercis Cabadensis	Redbud	Calcareous soils mostly
0-0	Ilex opaca	Holly	
0-0	Acer Saccharum?	Sugar maple	Rich soils
0-0	Acer Floridanum?	Sugar maple	Creek bottoms
0-0	Acer leucoderme	Sugar maple	Bluffs, etc.
1-0	Acer saccharinum	Silver maple	Banks of Coosa River
2-3	Acer rubrum	Red maple	Along branches
1-1	Acer Negundo	Box elder	Along creeks and rivers
0-0	Tilia heterophylla?	Lin	Rich woods
3-3	Cornus florida	Dogwood	Dry woods
1-1	Nyssa sylvatica	Black gum	Various habitats
0-0	Nyssa biflora	Black gum	Talladega County
0-0	Nyssa uniflora	Tupelo gum	Sloughs, Shelby Co.
0-0	Oxydendron arboreum	Sourwood	Bluffs, etc.
0-0	Bumelia lycioides		Limestone outcrops
0-1	Diospyros Virginiana	Persimmon	Various habitats
1-0	Fraxinus Americana	Ash	Rich soils
0-0	Catalpa bignonioides	Catalpa	River banks
0-0	Viburnum rufidulum	Black haw	Dry woods

Evergreens seem to have made up about 40% of the original forests.

Population, etc.—Leaving out of consideration Jefferson County, which contains the largest city in the state, Birmingham, which draws its trade from hundreds of miles in every direction, and does not depend on the Coosa valley alone for its wealth, the density of population in this region was about 54 to the square mile in 1910. Nearly three-fourths of the inhabitants are white.

Agriculture alone, the way it is practised in America at the present time, would not support such a dense population; and many if not most of the people make their living from mining, manufacturing and commerce. Apparently a little over half, perhaps as much as 60%, of the region is still wooded, but the stock law prevails now over much of the area, particularly in Talladega County, which seems to have the largest proportion of land under cultivation.

Forest products.—This region contains more large towns and cities in proportion to its area perhaps than any other part of the state, and wood-manufacturing industries are numerous and varied for this reason, if for no other. Of the industries listed by Harris and Maxwell for Alabama about 20% are located in this region. Nearly half of these, however, are in Birmingham, and very likely much of their raw material is brought in from other regions and even from other states by the numerous railroads centering there.

The Southern Lumberman's directory mentions 69 sawmills located in this region (which is 11.7% of the number in the whole state, and a larger number in proportion to the amount of woodland than in any other region except the Tennessee Valley), with an average capacity of 12,070 feet a day. The five largest mills cut from 20,000 to 60,000 feet a day, and average four miles of tram-road apiece. The secondary wood-working industries are even more highly developed than in the Tennessee valley, 23 such establishments being enumerated in the same publication. In variety of wood consumed the Coosa valley is second only to that of the Tennessee. Forty-one of the mills report long-leaf pine, 40 short-leaf pine, 2 "white pine," 12 hickory, 2 cottonwood, 2 beech, 2 chestnut, 40 white oak, 36 "red oak," 5 elm, 22 poplar, 10 sweet gum, 3 sycamore, 2 basswood (lin), 4 maple, 2 tupelo gum, and 4 ash, besides several species represented by one mill each. The principal wood products seem to be as follows:

Short-leaf and long-leaf pine lumber.
Doors, sash, blinds, mouldings, interior finish.
Shingles, laths, flooring.

Charcoal (less now than formerly).
Post-oak and long-leaf pine cross-ties.
Cooperage stock, baskets and crates.
Furniture, wagons, freight cars.
Handles, spokes, chair stock.
Cedar posts and pencil-wood.
Mine timbers.
Tan-bark.
Roots of sassafras and other small trees for medicinal purposes.

All the charcoal iron furnaces in the state, four in number, are located in this region, and they have been in operation about forty years each, on the average. Their combined annual capacity is about 80,000 tons of iron, and as the making of a ton of iron requires just about 100 bushels of charcoal, equivalent to about 1,900 feet of lumber, board measure, it is evident that an enormous amount of timber (mostly pine) has been consumed in this way. Some of the furnaces operate their own charcoal ovens, and others get their supplies from kilns at various convenient points. One of the largest charcoal plants is near Attalla, and there is another large one at Childersburg.

The naval stores industry does not seem to have invaded this region yet, unless at the extreme southwestern end. Its coming is probably only a question of time, though, for it is gradually creeping inland from the vast but depleted pine forests nearer the coast to the more scattered bodies of long-leaf pine among the mountains. In Talladega County especially there are considerable areas of this pine where it would seem profitable even now to establish the industry, provided a conservative method of exploitation (the Herty cup-and-gutter system or some modification of it) were used.

4. The Blue Ridge.
(Figures 19, 20.)

This begins in Pennsylvania, has its greatest development in a complex mountain system in western North Carolina, and tapers out in Alabama. In this state it comprises a single ridge with a few spurs branching off to the southeastward, and a few isolated peaks and ridges in the edge of the Coosa valley northwestward. The total area to be included in this region is uncertain on account of the vagueness of its southeastern boundary, but it is probably not more than 400 square miles.

References.—Harper 7, Mohr 6 (73), Mohr 8 (59-65), Reed (7-8, 9-10, 27-28), Smith 1 (37-43, 58-75), Smith 6 (87-88, 92, 100), Smith 7 (348-349, 361, 383), Smith 9 (6-7).

Geology and soils.—The main body of the Blue Ridge consists of metamorphic rocks, presumably mostly pre-Cambrian, though some of the strata must be much more recent, for Carboniferous fossils have been found at the southeastern base of the ridge in Clay County, according to Dr. Smith.† The outlying peaks and ridges lying to the northwestward, in Calhoun and Talladega Counties, are Cambrian (Weisner quartzite), but do not differ perceptibly in soil or vegetation from the metamorphic mountains. The rocks on all these mountains (as on many other southern mountains of various ages) are mostly sandstone, and there is comparatively little soil, but what little there is is rather sandy.

Topography and hydrography.—The Blue Ridge includes the highest mountain in Alabama (Cheaha, 2,400 feet above sea-level), and many peaks and ridges as high as 2,000 feet, or over 1,000 feet above the adjacent Coosa valley. The difference of elevation on the southeastern or Piedmont side is almost as great, so that from the main ridge on a clear day one can see in either direction as far as the curvature of the earth will allow.* The slopes of

†Science II.18:244-246. Aug. 21, 1903.

*There are no higher peaks in sight from which to estimate distance, but the view from Cheaha must embrace at least 10,000 square miles.

the ridges are steep and their summits narrow and undulating. There are very few cliffs high enough to overtop the trees so as to be visible from the neighboring lowlands. Many swift clear streams course down the mountain slopes in ravines of moderate depth, but with few waterfalls of any size. Talladega Creek, which rises in Clay County and flows into the Coosa River, has cut a deep gap in the ridge a few miles from Talladega, which now affords passage for a railroad.

Climate.—No climatic data are available, as the region is almost uninhabited. But as a whole it is undoubtedly cooler and probably wetter than the regions on either side of it, on account of its greater altitude.

Forest types.—The principal forest types are those of dry ridges and slopes, and of damp ravines. Below 1,900 feet the long-leaf pine is a common tree, especially on the south side, but at higher elevations other pines take its place. The trees on the highest ridges are rather stunted, averaging perhaps ten feet tall.

Fires are rather frequent here, as in all other places where long-leaf pine is common.

LIST OF TREES.

20-18	Pinus palustris	Long-leaf pine	Dry slopes
6-7	Pinus Taeda	Short-leaf pine	Ravines
12-10	Pinus echinata	Short-leaf pine	Ridges and slopes
3-4	Pinus Virginiana		Rocky places
0-0	Juniperus Virginiana	Cedar	Cliffs
3-2	Hicoria alba	Hickory	Slopes
2-2	Hicoria glabra	(Pignut) hickory	Ridges
0-0	Bentula lenta	Birch	Cliffs
2-2	Fagus grandifolia	Beech	Ravines
3-2	Castanea dentata	Chestnut	Slopes
0-0	Castanea pumila	Chinquapin	Slopes
2-1	Quercus alba	White oak	Ravines
2-1	Quercus stellata	Post oak	Slopes and ridges
8-7	Quercus Prinus	Mountain or chestnut oak	Ridges
7-8	Quercus velutina	Black oak	Slopes and ridges
2-2	Quercus coccinea	Spanish oak	Ridges
8-10	Quercus Marylandica	Black-jack oak	Ridges
3-4	Magnolia glauca	Bay	Wet ravines
0-0	Magnolia macrophylla	Cucumber tree	Rich ravines
2-2	Liriodendron Tulipifera	Poplar	Ravines
0-1	Persea pubescens	Red bay	Wet ravines

LIST OF TREES—Continued.

0-1	Sassafras variifolium	Sassafras	Ridges, etc.
1-1	Liquidambar Styraciflua	Sweet gum	Ravines
3-2	Robinia Pseudacacia	Black locust	Slopes
1-1	Ilex opaca	Holly	Ravines
3-4	Acer rubrum	(Red) maple	Wet ravines
0-0	Tilia heterophylla ?	Lin	Rich ravines
3-3	Cornus florida	Dogwood	Ridges and slopes
1-1	Nyssa sylvatica	Black gum	Slopes
2-3	Oxydendron arboreum	Sourwood	Ravines and slopes
0-1	Diospyros Virginiana	Persimmon	

About 45% of these trees are evergreen, which is a little larger proportion than in any region previously described. Nearly all bottom-land trees are of course conspicuous by their absence. The (mountain) birch, *Betula lenta*, is in Alabama almost confined to this region, and the chestnut oak is more abundant here than in any other part of the state. The red bay, which is more abundant near the coast, here reaches its highest elevation. The same might be said also of the common bay and the long-leaf pine. (There are some reasons for believing that this part of Alabama was the original home of the latter.)

Economic features.—At least 90% of the Blue Ridge region has never been cleared, the ground being too steep and rocky to offer much attraction to the farmer. Cattle have had free range here, at least until very recently.

A great deal of long-leaf pine has been cut for lumber and charcoal, but the other timbers have not suffered so much from civilization. Some post-oak cross-ties and doubtless some chestnut oak tan-bark have been gotten out.

5. The Piedmont Region.

(Figures 21-24.)

Between the Blue Ridge and the fall-line, all the way from Pennsylvania to Alabama, is a belt of foot-hills averaging about 100 miles wide, known as the Piedmont region. In Alabama it covers about 5,000 square miles.

References.—Earle, Harper 4, Reed (7-44), Smith 1 (26-36, 43-57, 76-116), Smith 6 (24-27, 87-94), Smith 7 (184-190, 348-367), Smith 9 (66-70), Tuomey 2 (43-78).

Geology and soils.—The rocks of the Piedmont region in Alabama are presumably mostly pre-Cambrian (Archaean), metamorphic or crystalline, obscurely or not at all stratified, and devoid of fossils, but containing a great variety of minerals. Lithologically they are nearly all granitic, gneissic, or schistose, but there are also a few small belts of limestone, perhaps belonging to a later formation. The principal soil varieties are residual red clay, gray loam and shaly soil (the red predominating) on the uplands, some of them mixed with rock fragments of various sizes, and alluvial and colluvial soils in the valleys. They are mostly well supplied with all the essential mineral ingredients, except that they are a little deficient in lime. The richest upland soils seem to be in Chambers County.

Topography and hydrography.—The topography is maturely dissected, and all referable to normal erosion processes, there being no ponds or subterranean drainage such as characterize limestone regions. Away from the immediate vicinity of the Blue Ridge all the hills in any neighborhood usually rise to about the same level. The ridges are as a rule a little broader and more rounded than the valleys.

Springs are common, but all small. Branches and creeks are well developed, there being few points in the whole region more than half a mile from running water. The rivers all rise within the region, or on the slopes of the Blue Ridge, except the Coosa, which instead of continuing out to the end of its valley region and then directly across the coastal plain, like most other Alabama riv-

ers of the same class, turns nearly at a right angle to its former course, leaves the comparatively soft Paleozoic rocks, and cuts across the western end of the Piedmont region for a distance of about fifty miles, resuming its original direction immediately upon crossing the fall-line at Wetumpka.

All the rivers and creeks are full of rocky shoals (which are being utilized more and more for water-power), and are navigable only for skiffs or other small boats. The larger streams are muddy most of the time, and fluctuate considerably, but they were undoubtedly clearer and more constant before so much of the forest was cut away.

Climate.—The climatological data for Goodwater and Opelika show that the average temperature of this part of Alabama is about 63°, and the length of the growing season about 235 days. The average precipitation is about 52 inches, and winter and spring are a little wetter than summer and fall, as in all the regions previously discussed.

Forest types.—The principal forest types are dry woods on the ridges, rich woods on north slopes and in ravines, wet woods along branches, and strips of river-bank trees on the larger streams. The driest soils have the largest proportion of pines. Long-leaf pine seems to be entirely absent from the central portion of Chambers County, but becomes more and more abundant with increasing distance from that center of rich soil.

Fire is frequent in the long-leaf pine forests, as usual, moderately so among the short-leaf pines, and rare in other types of forest.

LIST OF TREES.

12-10	Pinus palustris	Long-leaf pine	Poorest soils
8-10	Pinus Taeda	Short-leaf pine	Various situations
10-8	Pinus echinata	Short-leaf pine	Dry woods
0-0	Taxodium distichum	Cypress	Along rivers near fall-line
0-0	Juniperus Virginiana	Cedar	Rocky places mostly
3-2	Hicoria alba	Hickory	Dry woods
2-1	Hicoria glabra	(Pignut) hickory	Dry woods

LIST OF TREES—Continued.

1-2	Salix nigra	Willow	Banks of streams
1-1	Carpinus Caroliniana	Ironwood	Near streams
1-1	Ostrya Virginiana		Ravines and bluffs
1-1	Betula nigra	Birch	Along creeks and rivers
3-2	Fagus grandifolia	Beech	Rich woods
1-0	Castanea dentata	Chestnut	Slopes
3-2	Quercus alba	White oak	Richer soils
4-3	Quercus stellata	Post oak	Dry woods
1-2	Quercus Prinus	Chestnut oak	Rocky slopes
0-0	Quercus Michauxii	Swamp chestnut oak	Bottoms
4-3	Quercus falcata	Red oak	Dry woods
1-1	Quercus velutina	Black oak	Dry woods
1-0	Quercus rubra		Ravines
2-1	Quercus coccinea	Spanish oak	Dry woods
0-0	Quercus Catesbaei		Dry hills, Elmore County
3-4	Quercus Marylandica	Black-jack oak	Driest soils
0-0	Quercus cinerea		Poor soils, southern edge
2-2	Quercus nigra	Water oak	Low grounds
0-0	Quercus laurifolia		
0-0	Quercus Phellos	Willow oak	Bottoms
0-0	Ulmus alata	Elm	
1-0	Morus rubra	Mulberry	Rich woods and banks
2-3	Magnolia glauca	Bay	Wet woods
0-0	Magnolia tripetala	Cucumber tree	Ravines, etc.
1-1	Magnolia macrophylla	Cucumber tree	Ravines and bluffs
4-4	Liriodendron Tulipifera	Poplar	Ravines, wet woods, etc.
0-0	Persea pubescens	Red bay	Wet woods
1-1	Sassafras variifolium	Sassafras	
4-5	Liquidambar Styraciflua	Sweet gum	Various situations
1-2	Platanus occidentalis	Sycamore	Along creeks and rivers
0-0	Amelanchier Canadensis	Service-berry	Rich woods
0-0	Crataegus spathulata	Haw	Dry woods
0-0	Crataegus viridis	Haw	Bottoms
1-0	Prunus serotina	Wild cherry	Ravines and cliffs
1-1	Cercis Canadensis	Redbud	
0-0	Robinia Pseudacacia	Black locust	Rich woods, northward
1-1	Ilex opaca	Holly	Ravines, etc.
0-0	Ilex decidua		Bottoms
1-1	Acer leucoderme	Sugar maple	Ravines and bluffs
0-0	Acer saccharinum	Silver maple	Banks of Coosa River
3-4	Acer rubrum	Red maple	Wet woods
0-1	Acer Negundo		River-banks
0-0	Tilia heterophylla?	Lin	River-banks
3-3	Cornus florida	Dogwood	Dry woods

LIST OF TREES—Continued.

2-2	Nyssa sylvatica	Black gum	Various situations
2-2	Oxydendron arboreum	Sourood	Bluffs, etc.
0-1	Diospyros Virginiana	Persimmon	
0-0	Halesia Carolina		Rich woods
0-0	Halesia diptera		River-banks, southward
1-1	Symplocos tinctoria	Sweet-leaf	Bluffs, etc.
2-1	Fraxinus Americana	Ash	Rich woods
0-0	Catalpa bignonioides	Catalpa	River-banks
1-0	Viburnum rufidulum	Black haw	Dry and rich woods

About 35% of the trees in the original forests seem to have been evergreen.

Population, amount of woodland, etc.—In 1910 this region had about 40 inhabitants to the square mile, an increase of a little over 10% in ten years. About two-thirds of the population is white. About half, perhaps as much as 60%, of the area is still wooded, the proportion varying considerably in different counties, however. Clay and Coosa Counties probably have the greatest amount of woodland and Chambers and Lee the least. Until recently cattle had free range in the more hilly sections, but now the stock law seems to prevail throughout.

Forest utilization.—The three pines, the hickories, the white and post oaks and poplar, have been cut a good deal for lumber and other purposes, but the other trees have not been disturbed much except by the farmers. The naval stores industry, which seems to have invaded this area only since the beginning of the present century (no doubt somewhat to the astonishment of the natives of this long-settled region), threatens still further damage to the long-leaf pine unless the most approved methods are used; which however is being done in most places, apparently. About 4% of the state's wood-using industries are located in this region or on its borders. The principal forest products seem to be as follows:

Short-leaf and long-leaf pine lumber, and various finished products thereof.
Post oak cross-ties.
Poplar lumber, also logs exported whole.

Naval stores.
Doors, sash, blinds, columns.
Chestnut poles.
Furniture.
Hickory handles.
Charcoal (decreasing).
Honey.
Poplar bark horse-collars.
Hickory nuts and chestnuts.

The Southern Lumberman enumerates 46 sawmills in this region, with an average capacity of 7,300 feet a day, and 7 other wood-working establishments, which seems an underestimate. The low average capacity is doubtless correlated with the discontinuity of the forests. Thirty-one of the mills cut long-leaf pine, 21 short-leaf, 2 "white pine" (whatever that may mean), 2 cypress, 4 hickory, 2 beech, 18 white oak, 15 red oak, 16 poplar, 5 sweet gum, and 2 ash. None of the mills located within the region seem to be large enough to operate tram-roads, but near the Coosa River a few tram-roads belonging to larger mills in other regions penetrate this one for short distances.

THE COASTAL PLAIN (Regions 6-15).

6. The Central Pine Belt.

Extending in a gentle curve from a little south of the middle of the eastern border of the state to the northwestern corner, and widening out considerably to the northwestward, is what may be appropriately designated the central pine belt. Its underlying strata, as well as much of the surface material, are Cretaceous, mostly fresh-water deposits, judging from the absence of marine fossils. Three divisions of it are recognizable, though not very sharply defined, namely, the short-leaf and long-leaf pine and Eutaw belts.

A. Short-leaf Pine Belt.
(Figures 25-27.)

This covers about 5,100 square miles in Alabama, and extends northwestward into Mississippi. Eastward it narrows rapidly, but there are indications of the same sort of country bordering the fall-line in Georgia and Maryland.

References.—Harper 5, McCalley 2 (19-22, 40-51, 75-80, 102-109, 125-127), Mohr 3 (529), Mohr 6 (95-96), Mohr 8 (90, 96-97), Smith 6 (47-51, 118-127), Smith 7 (243-252, 433-459), Smith 8 (67, 307-344, 349, 529-532, 536, 540-542, 545-546, 559-560), Smith 9 (113-123).

Geology and soils.—The strata of this belt are of the Tuscaloosa formation, and present quite a variety of appearances in cuts and gullies, including regularly stratified gray clays, cross-bedded pink and yellow sands, and clay mottled in various colors and patterns, some red and white, some liver-colored, and some mouse-colored. The clay on exposure often becomes intersected by a network of fine cracks a fraction of an inch apart, giving an ap-

pearance which is very characteristic of this formation and almost peculiar to it. In many places the formation is full of pebbles, mostly well-rounded quartz pebbles eastward and sub-angular chert pebbles northwestward. Layers of ferruginous sandstone, usually approximately horizontal but often irregular, and varying from about a quarter of an inch to several inches in thickness, are common, especially on and near the surface of the ground. Where the formation has been long exposed to weathering almost all phases of it may pass into a dull reddish loam, very similar to the Lafayette, a superficial formation which is found in all parts of the coastal plain.

The Lafayette is undoubtedly present also over large areas of this region. Artificial sections of it along railroads, etc., are of course chiefly confined to uplands, and its usual appearance there is a brick-red loam, very homogeneous and usually not over ten feet in thickness, with smooth surfaces intersected by a network of very shallow cracks usually a foot or two apart. In roadside ditches on slopes "pot-holes" from about a foot to a yard in diameter and about the same in depth are very characteristic of this formation. Rounded ferruginous concretions from a fraction of an inch to a few inches in diameter abound in some places, especially on the surface. Little is known about the character of the Lafayette formation where it lies below the level of ground-water, but in such situations its red color must be lacking, if nothing else.

Both the Tuscaloosa and Lafayette formations are likely to be rather sandy near the surface, especially on level ground. The soils derived from them consist of varying proportions of clay and sand (the sand being most prevalent eastward), and are somewhat deficient in lime and potash.

Topography and hydrography.—In Franklin County the uplands of this region are about 1,000 feet above sea-level, which seems to be the greatest elevation recorded in any part of the coastal plain. The lowest altitude in the short-leaf pine belt is a little less than 100 feet, along the Warrior River. The topography varies from nearly level—particularly on the high terraces or third bottoms

of the larger rivers, and on uplands remote from streams —to rather hilly, and is all due to normal erosion. The streams are of all sizes, from the numerous small clear branches to the large muddy rivers which rise in the mineral region and cross this belt almost at right angles. Most of them are bordered by more or less swamp. Springs are fairly common, but all small.

Climate.—The average temperature is about 63°, the length of the growing season (which of course varies considerably with latitude) from about 205 to 240 days, and the average annual rainfall about 50 inches. The summers are about as dry here as in the Tennessee valley, or even drier in the northwestern portion. The climatological data for Tuscaloosa, given in the table, probably represent the average for the whole region pretty well.

Forest types.—These include dry pine, oak and hickory woods on the uplands, richer woods with beech, white oak, sweet gum, etc., on bluffs and in ravines or valleys, non-alluvial swamps along the smaller streams, small areas of muddy alluvial swamp near some of the rivers, and the usual river-bank vegetation. Fires are rare in the valleys but moderately frequent on the uplands, especially where the long-leaf pine grows.

LIST OF TREES.

5-4	Pinus palustris	Long-leaf pine	Poorest soils
20-20	Pinus Taeda	Short-leaf pine	Nearly everywhere
0-0	Pinus serotina	Black pine	Non-alluvial swamps
10-6	Pinus echinata	Short-leaf pine	Dry woods
1-1	Taxodium distichum	Cypress	Alluvial swamps
0-0	Juglans nigra	Black walnut	Richest soils
0-0	Hicoria aquatica		Alluvial swamps
0-0	Hicoria ovata	Scaly-bark hickory	Rich soils
2-1	Hicoria alba	Hickory	Dry woods
1-0	Hicoria glabra	(Pignut) hickory	Dry woods
2-3	Salix nigra	Willow	Along streams
0-0	Populus deltoides	Cottonwood	Along creeks and rivers
1-1	Carpinus Caroliniana	Ironwood	Low grounds
1-1	Ostrya Virginiana		Bluffs, etc.

LIST OF TREES—Continued.

0-1	Betula nigra	Birch	Along creeks and rivers
4-4	Fagus grandifolia	Beech	Bluffs and bottoms
0-0	Castanea dentata	Chestnut	Hillsides
0-0	Castanea pumila	Chinquapin	Dry woods
4-3	Quercus alba	White oak	Various situations
4-3	Quercus stellata	Post oak	Dry woods
0-1	Quercus lyrata		River-bottoms
0-0	Quercus Prinus	Chestnut oak	Ravines and bluffs
0-0	Quercus Muhlenbergii		
1-1	Quercus Michauxii	Swamp chestnut oak	Bottoms
2-3	Quercus falcata	Red oak	Dry uplands
0-0	Quercus pagodaefolia		Bottoms
0-0	Quercus velutina	Black oak	Dry woods
0-0	Quercus rubra		Ravines and bluffs
1-0	Quercus coccinea	Spanish oak	Dry uplands
0-0	Quercus Catesbaei		Poorest soils
2-2	Quercus Marylandica	Black-jack oak	Driest soils
0-1	Quercus cinerea		Poorest soils
3-4	Quercus nigra	Water oak	Low grounds
1-1	Quercus laurifolia		Sandy banks of streams
1-1	Quercus Phellos	Willow oak	Bottoms
0-0	Ulmus Americana	Elm	
0-0	Ulmus alata	Elm	
0-0	Planera aquatica		Banks of Warrior River
0-1	Celtis occidentalis	Hackberry	River-banks, etc.
1-0	Morus rubra	Mulberry	Richer soils
5-6	Magnolia glauca	Bay	Non-alluvial swamps
0-0	Magnolia acuminata	Cucumber tree	Rich woods
0-0	Magnolia tripetala	Cucumber tree	Rich woods
0-0	Magnolia pyramidata	Cucumber tree	Rich woods
2-2	Magnolia macrophylla	Cucumber tree	Bluffs, etc.
5-4	Liriodendron Tulipifera	Poplar	Ravines and bluffs
0-0	Asimina triloba	Pawpaw	Bottoms
0-0	Persea pubescens	Red bay	Non-alluvial swamps
0-0	Sassafras variifolium	Sassafras	
5-5	Liquidambar Styraciflua	Sweet gum	Various situations
1-2	Platanus occidentalis	Sycamore	Along creeks and rivers
0-0	Amelanchier Canadensis	Service-berry	Bluffs, etc.
0-0	Crataegus spathulata	Haw	Dry woods
0-0	Crataegus viridis	Haw	Bottoms
0-0	Prunus serotina	Wild cherry	Bluffs, etc.
0-0	Cercis Canadensis	Redbud	
0-0	Gleditschia triacanthos	Honey locust	
0-0	Cyrilla racemiflora	Tyty	Creek swamps
1-1	Ilex opaca	Holly	Ravines and bluffs
0-0	Ilex decidua		River-bottoms
0-0	Acer Floridanum	Sugar maple	Bottoms, etc.

LIST OF TREES—Continued.

0-0	Acer saccharinum	Silver maple	River-banks
3-4	Acer rubrum	Red maple	Non-alluvial swamps
0-1	Acer Negundo		River-banks, etc.
0-0	Tilia heterophylla?	Lin	Bluffs, etc.
3-3	Cornus florida	Dogwood	Dry woods
1-1	Nyssa sylvatica	Black gum	Various situations
1-2	Nyssa biflora	Black gum	Non-alluvial swamps.
1-1	Nyssa uniflora	Tupelo gum	Sloughs, etc.
1-1	Oxydendron arboreum	Sourwood	Bluffs, etc.
0-0	Bumelia lycioides		
0-1	Diospyros Virginiana	Persimmon	Old fields mostly
0-0	Symplocos tinctoria	Sweet-leaf	Valleys and bluffs
0-0	Fraxinus Americana	Ash	Rich soils
0-0	Fraxinus Caroliniana	Ash	Swamps
0-0	Catalpa bignonioides	Catalpa	River-banks
0-0	Viburnum rufidulum	Black haw	Dry woods

This region, although belonging strictly to the coastal plain geologically, has a good deal in common with the hill country in its vegetation. Some of its trees are more characteristic of one section and some of the other; and it seems to have a greater variety of trees than any other region into which the state is here divided. There are at least 17 kinds of oak, though some of them are rather rare here. About 44% of the trees in the original forests were evergreen; which is a higher percentage than we have found anywhere in the hill country (except in the Blue Ridge), though rather low for the coastal plain.

Density of population, etc.—In 1910 the short-leaf pine belt had about 30 inhabitants to the square mile, an increase of 22% in the ten years preceding. Just about 75% of the inhabitants are white. The region is still pretty well wooded, probably to the extent of about 75% of its area. Cattle had free range in nearly all parts up to within a few years, but now the stock law is in force in several counties and beats.

Forest utilization.—Although the pines have been cut a good deal for lumber, the commoner short-leaf (*Pinus Taeda*) has probably more than held its own, on account of its propensity for spreading in old fields and other

clearings. About 20% of the sawmills and 15% of the other wood-working industries of the state are located in this region, which has only 9.8% of the total area. The Southern Lumberman enumerates 120 mills, with an average capacity of 15,000 feet a day. Nine of these mills operate tram-roads, with an aggregate length of 57 miles. Fifty-five of them report long-leaf pine and three white pine, but these figures must be exaggerated, for several of the mills reporting long-leaf pine are located in counties where that species is unknown, and none of the trees which might pass for white pine are known to grow in this region at all. Of course some of these two woods may be imported, but that does not seem reasonable in a region so abundantly supplied with timber. Ninety-eight mills cut short-leaf pine, 6 cypress, 16 hickory, 6 beech, 51 white oak (etc.), 41 red oak (etc.), 2 elm, 67 poplar, 30 sweet gum, 10 tupelo gum, and 3 ash. Those mills which cut 25,000 feet or more in a day are usually provided with a waste-burner, a device very rarely seen in the hill country. Only six cut as much as 50,000 feet a day, and two or three of those get part of their timber from other regions. The principal forest products seem to be as follows:

Short-leaf and long-leaf pine lumber.
Post oak and pine cross-ties.
Sash, doors, blinds.
Cooperage stock.
White oak baskets and chair-bottoms.
Sweet gum and black gum columns.
Chestnut and cypress poles.
Pine and poplar shingles.
Charcoal.
Honey.

B. (Central) Long-leaf Pine Hills.
(Figures 28-30.)

The boundaries of this belt are so vague that its area cannot be estimated with accuracy, but it is probably about 850 square miles. Besides the area shown on the map there are several patches of almost precisely similar country a few square miles in extent in the eastern part of Tuscaloosa County within a few miles of Brookwood, where the underlying rocks are Coal Measures. Although this belt does not extend beyond the borders of the state, it has a good deal in common with the fall-line sand-hills of Georgia and the Carolinas. Westward it has no counterpart.

References.—Reed (44-68), Smith 8 (349, 541, 545-546). Also U. S. soil surveys of Hale, Bibb, Perry and Autauga Counties.

Geology and soils.—The strata of this belt are all of the Tuscaloosa formation, and vary from pink and yellow cross-bedded loamy sands to mottled white and purple clays, with the various phases often passing into each other in short distances horizontally. The liver-colored and mouse-colored clays with their fine network of cracks, described under the short-leaf pine belt, seem to be wanting here. The summits of many of the hills are capped with ledges of horizontally bedded blackish ferruginous sandstone, which are doubtless only local indurations. Thin plates and fragments of the same kind of rock and of shiny brown limonite are strewn profusely over many of the higher slopes. The Lafayette formation, if it exists in this belt, is less typical than elsewhere. The soils are mainly sandy, and deficient in lime.

Topography and hydrography.—This belt is pretty hilly, for the coastal plain, and almost mountainous in Tuscaloosa County, where some of the hilltops are probably at least 250 feet above valleys less than half a mile distant. The valleys are rather narrow, and sometimes ravine-like. The northeastern or inland edge of this belt makes a sort of escarpment which can be seen from the Mobile & Ohio R. R. nearly all the way from Duncanville

in Tuscaloosa County to Trio in Bibb, a distance of about 30 miles. Streams are fairly numerous, but mostly small, and many of the smaller valleys are dry a large part of the time. The water in the ground and in the streams is above the average in purity, and it does not seem to fluctuate much. Where the M. & O. R. R. passes through this belt in Chilton and Autauga Counties it has at least two water-tanks fed automatically by pumps operated by breast-wheels located on small creeks.

A minor topographic feature which reaches its inland limit in this kind of country is the salamander hills, small mounds of sand thrown up in long-leaf pine forests (especially soon after fires in winter and spring) by the salamander, a subterranean rodent which lives in sandy soils in the coastal plain from the Warrior River eastward to the Savannah.*

Forest types.—Reed, in his excellent description of a part of this region, recognizes only two types of forest, the long-leaf pine type on the hills and the creek type in the valleys. Each could be subdivided somewhat, however, especially the last, for streams of different sizes are usually bordered by different kinds of swamp vegetation. Fire is frequent in the long-leaf pine land.

LIST OF TREES.

30-20	**Pinus palustris**	Long-leaf pine	Hills
10-12	**Pinus Taeda**	Short-leaf pine	Valleys
0-0	**Pinus serotina**	Black pine	Sandy swamps
5-6	**Pinus echinata**	Short-leaf pine	Hills
0-0	**Pinus Virginiana**		Sterile hills, Tuscaloosa County
1-0	Hicoria alba	Hickory	Slopes
0-0	Hicoria glabra	(Pignut) hickory	Slopes
0-1	Salix nigra	Willow	Along creeks
0-0	Carpinus Caroliniana	Ironwood	Along creeks
0-0	Fagus grandifolia	Beech	Valleys
1-0	Castanea dentata	Chestnut	Slopes
2-1	Quercus alba	White oak	Valleys
1-1	Quercus stellata	Post oak	Slopes
1-2	Quercus Margaretta	Post oak	Ridges
1-1	Quercus Prinus	Chestnut oak	Slopes
3-4	Quercus falcata	Red oak	Ridges and slopes

*See Science II.35:115-119, Jan. 19, 1912.

LIST OF TREES—Continued.

0-0	Quercus velutina	Black oak	Hills
5-7	Quercus Catesbaei	Turkey oak	Ridges
7-8	Quercus Marylandica	Black-jack oak	Hills
4-5	Quercus cinerea	Upland willow oak	Hills
2-2	Quercus nigra	Water oak	Along creeks
4-5	Magnolia glauca	Bay	Along branches, etc.
0-0	Magnolia tripetala	Cucumber tree	Ravines
1-1	Magnolia macrophylla	Cucumber tree	Valleys
3-3	Liriodendron Tulipifera	Poplar	Valleys
0-0	Persea pubescens	Red bay	Along branches
1-2	Liquidambar Styraciflua	Sweet gum	Valleys
0-1	Cyrilla racemiflora	Tyty	Along creeks
1-1	Ilex opaca	Holly	Valleys
2-3	Acer rubrum	(Red) maple	Along branches
3-3	Cornus florida	Dogwood	Hills
1-1	Nyssa sylvatica	Black gum	Slopes
2-2	Nyssa biflora	Black gum	Swamps
1-2	Oxydendron arboreum	Sourwood	Slopes
0-0	Diospyros Virginiana	Persimmon	

In the original forests about 52% of the trees were evergreen, most of which figure was made up of long-leaf pine. There are more species of oak in proportion to other trees here than in most other parts of the state.

Economic features.—This belt is so narrow that it is difficult to form any estimate of its population. Cultivated tracts are mostly confined to the valleys, and probably do not exceed 13% of the area. Open range for cattle seems to be the rule. A great deal of the long-leaf pine and some of the two short-leaf pines has been cut for lumber, but there has not been much demand yet for the other trees. In this belt, particularly in Chilton and Autauga Counties, are quite a number of large and more or less permanent sawmills, each with a pond and a waste-burner, a type more frequent in the southern parts of the state. The large mill of the Kaul Lumber Co., recently erected near Tuscaloosa, derives its timber from this belt, transporting it by rail across the short-leaf pine belt for about 15 miles. The principal forest products are lumber and naval stores.

According to the Southern Lumberman there are 18 sawmills in this region or very close to it, with an average capacity of 40,000 feet a day (which is not exceeded

by any other region in the state). The total capacity is larger in proportion to area and population than in any other region, except—in the case of population—no. 14, which is practically uninhabited. Six of the mills operate tram-roads, aggregating 108 miles in length, but most of these pass through other regions as well. At the same time there is no telling how many logs from this region are hauled out to mills elsewhere.

C. The Eutaw Belt.

This takes its name indirectly from the town of Eutaw, the county-seat of Greene County. It is a narrow belt, more easily defined geologically than geographically, bordering the short-leaf pine belt on the southwest. It covers about 1,500 square miles in Alabama, and extends without much change into Georgia and Mississippi.

References.—Bartram (388-398?), Lyell (37-41), Smith 8 (290-303, 321, 350, and several county descriptions).

Geology and soils.—This belt coincides with the outcrop of the Eutaw formation, a division of the Cretaceous lying next above the Tuscaloosa. The formation consists mostly of laminated clays and cross-bedded sands, and the latter are more or less glauconitic and phosphatic. The Lafayette red loam seems to cover the greater part of the area, however, as in most other parts of the coastal plain. The soils are similar to those of the short-leaf pine belt, but a little richer, on the average, owing no doubt to the greater amount of potassium and phosphorus in the formation.

Topography and hydrography.—The topography does not differ much from that of region 6A. Although rather less hilly, on the whole, there is along Autauga Creek at Prattville an inland-facing escarpment about 200 feet high, which when viewed from a mile or two to the northeastward looks like a small mountain.

In proportion to area this region has more creeks and rivers than the other two divisions of the central pine

belt. The same rivers which cross them also cross this, and the Tombigbee, Alabama and Tallapoosa flow lengthwise of it for some distance.

Climate.—Montgomery is pretty centrally located in this region, and some climatic data for that place can be found in Appendix B.

Forest types.—The forest types are also so similar to those of the short-leaf pine belt that it is hardly worth while to describe them. The relative abundance of the trees is somewhat different, though, as will appear from the following list:

LIST OF TREES.

4-3	Pinus palustris	Long-leaf pine	Poorest soils
15-12	Pinus Taeda	Short-leaf pine	Generally distributed
6-4	Pinus echinata	Short-leaf pine	Dry woods
1-1	Pinus glabra	Spruce pine	Elmore Co. and eastward
2-3	Taxodium distichum	Cypress	Swamps
0-0	Juniperus Virginiana	Cedar	
1-1	Hicoria aquatica		Alluvial swamps
2-1	Hicoria alba	Hickory	Dry woods
2-3	Salix nigra	Willow	Along streams
1-1	Populus deltoides	Cottonwood	River-banks, etc.
0-0	Carpinus Caroliniana	Ironwood	Low grounds
1-2	Betula nigra	Birch	Along streams
4-4	Fagus grandifolia	Beech	Ravines, etc.
1-0	Castanea dentata	Chestnut	
0-0	Castanea pumila	Chinquapin	Dry woods
2-1	Quercus alba	White oak	Moderately rich soils
3-2	Quercus stellata	Post oak	Dry soils
1-2	Quercus lyrata	Swamp post oak	Muddy swamps
1-1	Quercus Michauxii	Swamp chestnut oak	Bottoms
3-4	Quercus falcata	Red oak	Dry woods
0-0	Quercus pagodaefolia		River bottoms
0-0	Quercus velutina	Black oak	Dry woods
2-1	Quercus coccinea	Spanish oak	Dry woods
0-1	Quercus Catesbaei	Turkey oak	Sandiest soils
1-1	Quercus Marylandica	Black-jack oak	Driest soils
0-1	Quercus cinerea		Poorest soils
5-4	Quercus nigra	Water oak	Low grounds
2-2	Quercus laurifolia		Sandy banks, etc.
3-3	Quercus Phellos	Willow oak	Bottoms, etc.
1-0	Ulmus alata	Elm	Low grounds
0-0	Planera aquatica		River-banks
0-0	Celtis occidentalis	Hackberry	River-banks

LIST OF TREES—Continued.

2-1	Morus rubra	Mulberry	Bottoms, etc.
1-1	Magnolia grandiflora	Magnolia	Hammocks, southeastward
5-6	Magnolia glauca	Bay	Non-alluvial swamps
5-4	Liriodendron Tulipifera	Poplar	Ravines, etc.
0-0	Sassafras variifolium	Sassafras	
7-7	Liquidambar Styraciflua	Sweet gum	Generally distributed
2-3	Platanus occidentalis	Sycamore	Along creeks and rivers
0-0	Cyrilla racemiflora	Tyty	Creek swamps
2-2	Ilex opaca	Holly	Ravines, etc.
2-2	Acer saccharinum	Silver maple	River-banks
2-3	Acer rubrum	(Red) maple	Non-alluvial swamps
0-0	Tilia heterophylla?	Lin	
2-1	Cornus florida	Dogwood	Dry woods
1-1	Nyssa biflora	Black gum	Non-alluvial swamps
1-2	Nyssa uniflora	Tupelo gum	Sloughs, etc.
1-1	Oxydendron arboreum	Sourwood	Ravines, etc.
0-1	Diospyros Virginiana	Persimmon	
0-0	Catalpa bignonioides	Catalpa	River-banks

About 39% of the trees in the original forests were evergreen, a somewhat smaller proportion than in the other parts of the central pine belt, as might have been expected from the richer soil. There are two interesting trees in this belt which are not found in any of those previously described, namely the spruce pine, *Pinus glabra*, and the magnolia, *Magnolia grandiflora*. Both are very characteristic of hammocks* nearer the coast, and

*"Hammock" is a geographical term used only in the coastal plain (more in Florida than anywhere else) to designate a dense stand of trees other than pines, growing in comparatively dry soil (and thus distinguished from a swamp) in a region where open grassy pine forests predominate. Most hammocks are shady and have some natural protection against fire on one or more sides, and therefore contain considerable humus. (See Ann. Rep. Fla. Geol. Surv. 3:217; Bull. Torrey Bot. Club 38:515-525. 1911.)

The word has also been spelled hamak, hommock and hummock; the last-named form, which may have originated in a mere typographical error, having caused a great deal of misunderstanding. (See Science II.22:400-402. Sept. 29, 1905. Its use in Dr. Smith's two contributions to the 6th volume of the Tenth Census was probably due to the interference of some editor in Washington.) The matter has however been set right in "Webster's New International Dictionary," 1909, and other dictionaries will probably fall into line sooner or later.

reach their inland limits a few miles north of Montgomery.

Economic features.—The population of this region is doubtless denser than in most other parts of the central pine belt, but about two-thirds of the area seems to be still wooded; perhaps not more than half with virgin forest, though. The virgin forest is chiefly confined to swamps and bottoms. The forest products are much the same as in the short-leaf pine belt. The region is fairly well supplied with railroads and navigable rivers.

For this belt the Southern Lumberman lists 22 sawmills, with an average capacity of 13,600 feet a day, and 7 other wood-working establishments, most of the latter located in Montgomery. Ten of the mills cut long-leaf pine, 15 short-leaf, one "spruce" (*Pinus glabra?*), 2 cypress, 3 hickory, 2 beech, 8 white oak, 5 red oak, 10 poplar, 5 sweet gum, 3 tupelo gum, and 2 ash.

7. The Black Belt.

(Figures 35-39.)

This well-defined region, also known as the cane-brake or prairie region, embracing about 4,300 square miles in Alabama, extends northwestward through Mississippi and a short distance into West Tennessee, making a crescent-shaped area. There is nothing at all resembling it anywhere farther east, but there is some very similar country in southwestern Arkansas and eastern Texas.

References.—Bartram (398-400?), Gosse, Hale, Lyell (41-42, 75-76), Mohr 8 (97-105)*, McGuire, Smith 6 (55-58, 68, 128-140), Smith 7 (265-272, 295, 459-492), Smith 8 (276-285, 350-352, and county descriptions), Smith 9 (13, 131-132, 144, 191), Tuomey 1 (122-137, 140-142), Tuomey 2 (134-135, 234-236; the last by E. Q. Thornton), Webb.

Geology and soils.—This region coincides exactly with the outcrop of the Selma Chalk (formerly called Rotten Limestone) one of the Cretaceous formations. The rock is a soft gray argillaceous limestone, remarkably uniform

*This also covers regions 6C and 8.

in composition throughout its whole extent and thickness. It weathers into a gray clay of exceptional fertility but somewhat difficult to cultivate, because it bakes hard in summer and becomes a very tenacious mud in winter. Chemical analyses of this soil made under Dr. Smith's direction at the time of the Tenth Census show 1 to 2% of lime, 0.20—0.44% of potash, and 0.10—0.51% of phosphoric acid. When the region was first settled much of the soil contained so much organic matter that it was almost black, contrasting with the red soils of neighboring regions, whence the name "black belt." The Lafayette red loam is rather sparsely represented in this region, but where it does occur it usually makes hills, being less easily eroded and dissolved than the Rotten Limestone. Within a few miles of the Alabama River in Lowndes and Dallas Counties a considerable area is covered with sand which may be even more recent than the Lafayette. (The sand-hills near Montgomery, mentioned on page 105 of Dr. Mohr's last book, but apparently not identified by previous or subsequent explorers, may be of a similar nature.)

The soils of the black belt have been described so fully in the publications above cited, and in some of the government soil surveys, that it is hardly necessary to give any more details about them here.

Topography and hydrography.—The Selma Chalk or Rotten Limestone differs from most other limestones in Alabama in that it is almost never hard enough to form steep hills, or pure enough to be dissolved by percolating waters so as to form lime-sinks, caves, subterranean streams and big springs, which are characteristic of so many limestone regions. The prevailing topography is gently undulating, in a manner difficult to describe, though probably due almost wholly to normal erosion processes. Some parts of the region, mostly remote from the rivers, are so level that the railroads have built several tangents (i. e., straight tracks) a dozen miles or more in length.

In the spots where the Lafayette sandy loam occurs there has been less erosion than elsewhere, and the conical hills formed by this feature have been described by

Tuomey and several subsequent writers. The rivers which traverse the region are bordered in most places by steep bare chalk bluffs of striking appearance. Swamps are comparatively infrequent. The rivers and creeks fluctuate considerably with the seasons, and are muddy most of the time. Small streams are rather scarce, especially in dry weather, and the ground-water lies at such a depth that shallow dug wells are not used much. The inhabitants who cannot afford artesian wells generally use cisterns.

Climate.—The climate of this region is well illustrated by the statistics for Uniontown and Selma. The average temperature is about 65° (which is just right for human comfort), and the growing season about 240 days. The annual rainfall averages about 49 inches, most of it coming in winter and spring, as in the regions previously described.

Forest types.—It is stated by several writers that when this region was first visited by white men there were many naturally treeless areas scattered over it; a circumstance from which one of its names is derived. But the greater part of the area has been under cultivation so long that it is well-nigh impossible to get any direct evidence of the location and extent of the treeless areas at the present time. The patches of Lafayette loam were pretty well wooded with short-leaf pines, post oaks, etc., and many of these forests still remain almost undisturbed, because the soil of such spots is considered so much less valuable than the residual calcareous soils near by. The other remaining forests are chiefly confined to the bottoms of creeks and rivers, and they include a considerable variety of useful hardwood trees.

Fires are rare in this region now, but may have been more frequent originally, and may have had something to do with the existence of the treeless spots, somewhat as in the case of the better known prairies of the Mississippi valley; which by the way resemble the region under consideration a good deal in soil, topography, herbaceous vegetation and crops, though very different geologically.

LIST OF TREES.

1-1	Pinus palustris	Long-leaf pine	Sand in Lowndes & Dallas Counties
7-8	Pinus Taeda	Short-leaf pine	Poorer soils
3-3	Pinus echinata	Short-leaf pine	Lafayette patches
1-1	Pinus glabra	White or spruce pine	Second bottoms, etc.
2-1	Taxodium distichum	Cypress	Swamps and sloughs
5-4	Juniperus Virginiana	Cedar	Chalk outcrops mostly
1-0	Juglans nigra	Walnut	Richest soils
1-1	Hicoria aquatica		Along rivers
3-2	Hicoria ovata	Scaly-bark hickory	Bottoms, etc.
2-2	Hicoria alba	Hickory	Dry woods .
1-3	Salix nigra	Willow	Along streams
1-3	Populus deltoides	Cottonwood	Along streams
1-1	Carpinus Caroliniana	Ironwood	Low grounds
0-0	Ostrya Virginiana		
0-1	Betula nigra	Birch	Banks of streams
2-1	Fagus grandifolis	Beech	Second bottoms, etc.
3-1	Quercus alba	White oak	Various situations
6-7	Quercus stellata	Post oak	Lafayette patches
0-0	Quercus Margaretta	Post oak	Sand. Dallas Co.
2-1	Quercus Durandii		Calcareous soils
1-1	Quercus lyrata	Swamp post oak	Bottom lands
2-1	Quercus Michauxii	Swamp chest-nut oak	Bottom lands
1-1	Quercus Schneckii		Bottom lands
4-5	Quercus falcata	Red oak	Lafayette patches
1-1	Quercus pagodaefolia		Bottom lands
0-1	Quercus Catesbaei		With long-leaf pine
1-2	Quercus Marylandica	Black-jack oak	Lafayette patches
0-0	Quercus cinerea		With long-leaf pine
1-2	Quercus nigra	Water oak	Low grounds
0-1	Quercus laurifolia		Sandy banks
4-5	Quercus Phellos	Willow oak	Low grounds
1-1	Ulmus Americana	Elm	Bottoms, etc.
4-3	Ulmus alata	Elm	Oak groves, etc.
2-0	Ulmus fulva	Slippery elm	Rich soils
0-0	Planera aquatica		River-banks
5-5	Celtis occidentalis	Hackberry	Bottoms, etc.
2-1	Morus rubra	Mulberry	Bottoms, etc.
0-1	Magnolia grandiflora	Magnolia	Second bottoms
0-1	Magnolia glauca	Bay	Sandy swamps in Lowndes and Dallas Counties
1-1	Liriodendron Tulipifera	Poplar	Non-calcareous soils
0-0	Persea Borbonia	Red bay	Second bottoms, etc.
8-8	Liquidambar Styraciflua	Sweet gum	Various situations
2-3	Platanus occidentalis	Sycamore	Along creeks and rivers
0-0	Amelanchier Canadensis	Service-berry	

LIST OF TREES.—Continued.

0-0	Crataegus spathulata	Haw	Dry woods
0-0	Crataegus Crus-galli	Haw	Calcareous soils
0-0	Crataegus viridis	Haw	Bottoms
1-0	Prunus Americana	Wild plum	Rich soils
0-0	Prunus Caroliniana		Second bottoms
2-1	Cercis Canadensis	Redbud	Dry woods
0-0	Xanthoxylum Clava-Herculis		Chalk bluffs
0-0	Ilex opaca	Holly	Second bottoms
0-0	Acer Floridanum	Sugar maple	Second bottoms
0-1	Acer saccharinum	Silver maple	River-banks
0-1	Acer rubrum	Red maple	Non-alluvial swamps
0-0	Acer Negundo		Along creeks and rivers
2-0	Tilia heterophylla?	Lin	Second bottoms, etc.
1-1	Cornus florida	Dogwood	Lafayette patches
0-0	Nyssa sylvatica	Black gum	Dry woods
0-1	Nyssa biflora	Black gum	Non-alluvial swamps
0-1	Nyssa uniflora	Tupelo gum	Sloughs
0-0	Bumelia lanuginosa		Along Catoma Creek, etc.
0-0	Bumelia lycioides		Limestone outcrops mostly
1-1	Diospyros Virginiana	Persimmon	Various situations
0-0	Halesia diptera		Second bottoms
4-2	Fraxinus Americana	Ash	Rich soils
0-0	Catalpa bignonioides	Catalpa	Creek banks
0-0	Viburnum rufidulum	Black haw	Second bottoms

Only about 19% of these trees are evergreen, which is a very low proportion for the coastal plain, and probably correlated with the abundance of lime and potash in the soil of this region. The proportion of evergreens seems to be greatest in the eastern half, where the summers are a little wetter; and it probably ranges from about 15% in Sumter County to 25% in Macon.

Population, etc.—Several of the oldest towns in the state, most of them county-seats, are located on slightly higher ground just outside of the black belt, but close enough to it to be markets for much of its produce. Among these are Eutaw, Greensboro, Marion, Montgomery and Tuskegee on the north, and Livingston, Fort Deposit and Union Springs on the south. This circumstance, in the absence of statistics for areas smaller

than counties, makes it difficult to estimate the population of the region accurately, but there seems to have been in 1910 about 49 inhabitants to the square mile, most of them negroes.

As in many other essentially agricultural regions with a similar density of population (e. g., parts of Middle Georgia, Middle Tennessee and Illinois, and most of Iowa and Missouri), the population decreased a little in the decade just past. The towns grew, but this was more than offset by the decrease in the rural districts. The principal reason for this state of affairs seems to be that the soil of such areas is so fertile that nearly all the arable land was taken up long ago, and as the farmers become more efficient with the increase of agricultural knowledge, improvement of farm machinery, etc., fewer of them are needed to cultivate a given area, and most of their sons have to seek their fortunes in town or in newer regions. Wherever that is the case further increase of population usually comes about only through the establishment of manufactures, as is well illustrated in the Tennessee valley (region 1b).

Some optimists like to believe that the present "back to the farm" agitation will soon increase the agricultural population of all these fertile regions again, but past experience does not lend much support to such a belief. It is easy to say that the large farms can be subdivided and cultivated more intensively, but it has not worked out that way in other states, except in the vicinity of manufacturing cities.

Conditions in Alabama are somewhat different from those in the Middle West, though. Before the use of commercial fertilizers became common in the black belt, say about 25 years ago, much of the soil had become somewhat impoverished by the prolonged cultivation of cotton, and overrun with Johnson grass and other persistent weeds; and since that time the sandy soils farther south, which respond generously to fertilization and are much more easily tilled and less subject to weeds than those of the black belt, have drawn thousands of progressive young men in that direction, leaving a large proportion of women, old men and negroes behind.

(Every black belt county has now more women than men.) On Jan. 23, 1913, the Montgomery Advertiser had on its editorial page an interesting little note on this movement of population, concluding with these words: "Wiregrass lands are now worth more than the Black Belt lands. Moreover, if the roll is called of the leading citizens of any Wiregrass city, it will be found that a majority of them were born in the Black Belt." (Although this may be a trifle overdrawn, or less true now than it would have been a few years ago, essentially the same would be true at corresponding distances from the coast in Georgia and Mississippi, too.)

However, several comparatively recent developments make it hazardous to predict what the future destiny of the black belt will be. The discovery of the cause of malaria about 1900, the arrival of the cotton-boll weevil a few years ago, the introduction of alfalfa and the increasing tendency to diversification of crops, the campaign for eradicating ticks and raising more and better cattle, the utilization of the abundant Rotten Limestone as the principal ingredient for Portland cement, the building of locks for slack-water navigation on the Tombigbee River, and finally the fact that some of the "wiregrass" counties are now just about as thickly settled as the black belt, all bring new elements into the problem. Just when the turning-point will come it is impossible to guess, but it is certain that the decrease of population in the black belt cannot continue indefinitely.

Forest utilization.—At the present time forests occupy probably not more than 25% of the area (more than that having been devoted to cotton alone in 1880, according to the Tenth Census,—Smith 6 in bibliography), and this is almost the only part of the state where treeless horizons are common. The stock law prevails throughout, and there is now almost as much pasture as plowed ground. The uplands were naturally cleared and cultivated first, as in most other parts of the state, so that those trees confined to swamps, river-banks, etc., are relatively more abundant now than they were originally.

Notwithstanding the limited extent of the forests, they are still furnishing a considerable variety of useful

products, such as post oak cross-ties, white oak cotton-baskets, cooperage stock, spokes and handles, cedar posts, and more highly elaborated articles like sash, doors, blinds and wagons.

Having the smallest proportion of woodland it is not surprising that this region should also have the fewest sawmills per square mile and per inhabitant. The Southern Lumberman's directory previously referred to enumerates 22 mills, with an average capacity of 13,400 feet a day, and 6 other wood-working establishments. The largest mills, one of which has a daily capacity of 40,000 feet, are located on navigable rivers, and doubtless obtain much of their timber from more densely wooded regions farther inland; so that if this outside timber could be eliminated from the statistics the output of the sawmills would show up much smaller. Only one tram-road is reported from the region, and that is only two miles long, with 35-pound rails.

Nine of the mills cut long-leaf pine, 19 short-leaf, one "white pine" (*Pinus glabra?*), 5 cypress, 5 hickory, 5 cottonwood, 2 beech, 12 white oak (etc.?), 12 red oak (etc.), 3 hackberry, 10 poplar, 10 sweet gum, 2 sycamore, 4 tupelo gum, and 6 ash.

8. Chunnennuggee Ridge or Blue Marl Region.

Going southward from the black belt, particularly in Bullock, Montgomery and Lowndes Counties, one ascends an escarpment sometimes 100 feet or more in height (called Chunnennuggee* Ridge at Union Springs, where it is perhaps most conspicuous), and enters a region of different aspect, extending all the way from Georgia to Mississippi (and with some interruptions to West Tennessee), and covering about 2,300 square miles in Alabama.

References.—Smith 6 (56, 58-61, 132, 135-142), Smith 7 (267-268, 273-278, 487-498), Smith 8 (352-356 and nu-

*Also spelled Chunnennugga and Chunnenugga, but the form given above seems to be preferred locally. It is easy to imagine how the others may have originated as typographical errors.

merous county descriptions), Smith 9 (226, 230-244), Tuomey 2 (135-143).

Geology and soils.—This region is underlaid throughout by the Ripley formation (uppermost Cretaceous), whose strata vary from marly to sandy; but most of the surface, and therefore of the soil, seems to be of the Lafayette formation. In some parts this is the usual red loam, but elsewhere, especially eastward, it is sandy enough for salamanders to live in. The soils are just about the average in fertility.

Topography and hydrography.—In the western half of the state, where this region is narrow, it is rather hilly throughout, with rather sharp ridges. Eastward, where it widens out and takes the place of the black belt, the topography is more diversified, comprising considerable areas of comparatively level country with low hills rising above it and narrow ravines cut into it, with many bluffs along the larger streams, and not much swamp. The streams are rather numerous, but seem to present no special noteworthy features.

Climate.—The weather stations at Fort Deposit, Union Springs and Eufaula are located in this region. The average temperature and length of the growing season are practically the same as in the black belt. The rainfall is a little more copious, and more evenly distributed through the year, especially eastward. (There may be some correlation between the wetter summers and the sandier soils in the eastern portion. (See footnote on page 24.)

Forest types.—These present no striking features. There are dry oak and pine woods on the uplands, swamps along some of the streams, and a hammock type of woodland in ravines and second bottoms. Fire does not seem to be very frequent now, though it may have been more so originally, before the forests were broken up so much by cultivated fields.

LIST OF TREES.

8-5	**Pinus palustris**	Long-leaf pine	Dry soils
9-11	**Pinus Taeda**	Short-leaf pine	Generally distributed
5-5	**Pinus echinata**	Short-leaf pine	Dry soils
4-4	**Pinus glabra**	Spruce pine	Sandy bottoms, etc.
1-0	**Juniperus Virginiana**	Cedar	Bluffs, etc.
2-2	**Myrica cerifera**	Myrtle	Ravines and bluffs
4-6	Salix nigra	Willow	Along streams
2-3	Populus deltoides	Cottonwood	Along streams
1-1	Carpinus Caroliniana	Ironwood	Creek bottoms, etc.
0-1	Betula nigra	Birch	Along creeks and rivers
3-2	Fagus grandifolia	Beech	Ravines and bluffs
3-2	Quercus alba	White oak	Richer soils
4-2	Quercus stellata	Post oak	Dry woods
0-0	Quercus Durandii		Calcareous soils
1-1	Quercus lyrata		Bottoms
2-2	Quercus Michauxii	Swamp chestnut oak	Bottoms
4-3	Quercus falcata	Red oak	Dry soils
0-1	Quercus Catesbaei	Turkey oak	Dry sand
2-1	Quercus Marylandica	Black-jack oak	Dry soils
3-4	Quercus **nigra**	Water oak	Low grounds
1-2	**Quercus laurifolia**		Ravines, bluffs, etc.
1-1	Quercus Phellos	Willow oak	Low grounds
2-2	Ulmus alata	Elm	Low grounds
1-1	Planera aquatica		Muddy river-banks
2-1	Morus rubra	Mulberry	Bottoms, etc.
2-2	**Magnolia grandiflora**	Magnolia	Ravines and bottoms
4-5	**Magnolia glauca**	Bay	Non-alluvial swamps
4-4	Liriodendron Tulipifera	Poplar	Ravines, etc.
1-1	Sassafras variifolium	Sassafras	
8-6	Liquidambar Styraciflua	Sweet gum	Various situations
2-3	Platanus occidentalis	Sycamore	Along creeks and rivers
1-1	Cercis Canadensis	Redbud	Bluffs, etc.
1-1	Cyrilla **racemiflora**	Tyty	Creek swamps, etc.
1-1	**Ilex opaca**	Holly	Ravines and bluffs
1-1	Acer saccharinum	Silver maple	River-banks
2-3	Acer rubrum	Red maple	Branch-swamps, etc.
0-1	Acer Negundo		Creek-banks, etc.
1-0	Tilia heterophylla ?	Lin	Ravines and bluffs
1-1	Cornus florida	Dogwood	Dry woods
1-2	Nyssa biflora	Black gum	Branch-swamps, etc.
1-1	Oxydendron arboreum	Sourwood	Ravines, etc.
0-1	Diospyros Virginiana	Persimmon	
0-0	**Osmanthus Americanus**		Ravines and bluffs
0-0	Catalpa bignonioides	Catalpa	River-banks

About 38% of the trees in the original forests were evergreen, a much larger proportion than in the adjoining black belt, but less than in most of the regions farther south.

Population, etc.—The density of population in this region was about 41 persons to the square mile in 1910, a slight decrease since 1900. Most of the inhabitants are negroes, but the proportion of them is not as large as in the black belt. About half of the region seems to be still wooded, but much of the forest is second growth. There is little or no free range for cattle at the present time.

Forest products.—The forest products are relatively unimportant, and mainly of the commoner sorts, such as short-leaf and long-leaf pine lumber and products, pine and oak cross-ties, white oak cotton baskets, etc. Some evergreens of various sorts are shipped north in winter for Christmas decorations. This industry will be described more particularly under region no. 11, where it is more prevalent.

For this region the Southern Lumberman lists 23 sawmills with an average capacity of 8,700 feet a day, besides one with 50,000, and 3 other wood-working establishments. Thirteen of the mills cut long-leaf pine, 22 short-leaf, 2 "white pine" (probably *Pinus glabra*), 2 hickory, 11 white oak, 12 red oak, 8 poplar, and 4 sweet gum. The 50,000-foot mill, at Prentice, Marengo County, operates 9 miles of tram-road, presumably extending into the post-oak flatwoods near by, which are much more heavily timbered.

9. The Post Oak Flatwoods.
(Figure 35.)

This is a very narrow belt, both in Alabama and in Mississippi, the only two states in which it is represented. The Alabama portion has been estimated by Dr. Smith (no. 6, p. 61; no. 7, p. 279) to cover 335 square miles.

References.—Smith 7 (279-281, 460-462, 470), Smith 6 (61-62, 128, 129, 132), Smith 8 (186-188, 592-593, 601-602, 609), Smith 9 (132, 188-189, 247-248), U. S. soil survey of Sumter County, and R. D. Webb.

Geology and soils.—The geological formation of this region is one of the Lower Eocene formations, the Sucarnochee or Black Bluff, and it forms the surface over most of the area, the Lafayette being apparently absent. The soil to a depth of many feet is a grayish or yellowish laminated or faintly mottled clay, tolerably pure, or at least with very little sand or lime in it. Fresh exposures of it in cuts and ditches soon become covered with fine cracks just like those described on page 72 for one phase of the Tuscaloosa formation. It is fairly well supplied with potash, but deficient in lime and nitrogen, and contains a rather high percentage of magnesia, which is believed to be detrimental to some plants. For this reason and also on account of its stiffness, and the scarcity of water, it is not cultivated much.

Topography and hydrography.—This belt is too narrow to have any well-marked topographic characters, but it is for the most part pretty level, as its name implies. Small shallow ponds are found in a few places. Some streams flow across it, but few originate in it.

Forest types.—The forests are nearly all of one type, dry open woods. There are doubtless some characteristic trees along the streams, but these have not been studied much. Fires presumably are moderately frequent.

LIST OF TREES.

3-2	**Pinus palustris**	Long-leaf pine	Poorest soils
22-20	**Pinus Taeda**	Short-leaf pine	Nearly everywhere
15-12	**Pinus echinata**	Short-leaf pine	Dry soils
2-2	Hicoria ovata	Scaly-bark hickory	
3-2	Hicoria alba	Hickory	Dry soils
1-2	Salix nigra	Willow	Along streams
1-1	Betula nigra	Birch	Along streams
1-1	Carpinus Caroliniana		Low grounds
3-3	Fagus grandifolia	Beech	Low grounds
2-2	Quercus alba	White oak	
11-9	Quercus stellata	Post oak	Dry soils
2-2	Quercus Michauxii	Swamp chestnut oak	Low grounds
5-6	Quercus falcata	Red oak	Dry soils
3-3	Quercus pagodaefolai		Low grounds
0-0	Quercus coccinea	Spanish oak	Dry soils
1-1	Quercus Marylandica	Black-jack oak	Driest soils
2-3	Quercus nigra	Water oak	Low grounds
0-0	**Quercus laurifolia**		
3-3	Quercus Phellos	Willow oak	Low grounds
1-1	Ulmus Americana	Elm	
2-2	Ulmus alata	Elm	
1-1	Celtis occidentalis	Hackberry	Low grounds
2-2	Liriodendron Tulipifera	Poplar	Along branches, etc.
0-1	**Magnolia grandiflora**	Magnolia	Creek bottoms
0-0	**Magnolia glauca**	Bay	Along branches
6-8	Liquidambar Styraciflua	Sweet gum	Various situations
2-2	Platanus occidentalis	Sycamore	Along creeks and rivers
0-0	Crataegus viridis?	Haw	Low grounds
0-0	**Ilex opaca**	Holly	
1-2	Acer rubrum	Black gum	Along branches, etc.
2-2	Nyssa sylvatica?	(Red) maple	
0-0	Oxydendron arboreum	Sourwood	Dry soils
0-1	Diospyros Virginiana	Persimmon	
0-0	Fraxinus Americana	Ash	

The three pines, constituting about 40% of the original forests, are evergreen, and the few much rarer evergreen trees increase this to about 42%. About the only noteworthy feature of this list is that the species are comparatively few in number, and nearly all common and widely distributed. The magnolia is the only one of them that is confined to the coastal plain.

Forest utilization.—Probably 80% of the area has never been cultivated, but a good deal of the three kinds

of pine has been cut for lumber, and doubtless much of the post oak for cross-ties, etc.

From the Southern Lumberman's directory it would appear that this region has more sawmills in operation to its area than any other, but the area is so small that there is considerable chance for error in this estimate. Their average capacity is pretty high, too, 23,800 feet a day. Probably half of them are of the "big mill" type, with tram-road and waste-burner. Of the nine mills reporting, two cut long-leaf pine and eight short-leaf (of two species, of course). White oak, red oak and poplar are reported by two mills each, and sweet gum by one. There seem to be 25 or 30 miles of logging railroad in the region, which is about as much to the square mile as any other region has.

10. The Southern Red Hills.

(Figures 36-39.)

This region extends uninterruptedly from South Carolina to West Tennessee, if not farther, and embraces about 8,000 square miles in Alabama. In the eastern half of the state, as in adjacent Georgia, its northern edge is marked by an inland-facing escarpment similar to the Chunnennuggee Ridge mentioned a few pages back, passing a few miles north of Troy and Clayton.

References.—Ball, Lyell (53-66), Mohr 3 (527-528), Mohr 5, 6 (39), Mohr 8 (106-110), Smith 6 (51-55, 68, 141-153), Smith 7 (252-265, 294, 496-528), Smith 8 (194 and numerous county descriptions, especially 610-625 and 629-637), Smith 9 (20, 239, 245-246, 263-267), Tuomey 1 (143-154), Tuomey 2 (244, by E. Q. Thornton), Winchell.

Geology and soils.—This region is underlaid by various Eocene formations, which have been named in Dr. Smith's reports and elsewhere Midway or Clayton, Naheola, Nanafalia, Bell's Landing or Tuscahoma, Wood's Bluff or Bashi, Hatchetigbee, Buhrstone, and Claiborne. (Most of these names are derived from Alabama localities, because the Eocene strata are more diversified

in Alabama than anywhere else in the whole coastal plain.) These strata vary greatly lithologically, especially in percentage of lime, but they do not affect the soil as much as they do the topography, for they are pretty well covered by a more homogeneous superficial formation, presumably the Lafayette. This is mostly a red loam, as usual, but eastward much of the surface is covered with loose yellowish sand, which may be a later formation, but is more likely a mere phase of the Lafayette. The soils are very diverse, ranging from nearly pure limestone on outcrops of the Midway formation to barren quartz sands. Most of them seem to be a little deficient in potash. The sandiness eastward may be correlated in some measure with the wetter summers in those parts, as was suggested in the case of region no. 8.

Topography and hydrography.—The topography is so diversified that it would be out of the question to attempt to describe all the numerous forms here. On the average it is moderately hilly, with the valleys a little swampy. The hills are usually somewhat broader than the valleys, and in some places they spread out into plateaus standing about 400 feet above sea-level, known locally as "red levels." In some of the more elevated areas the valleys are narrow and ravine-like, with no swamps. In Choctaw, Clarke and Monroe Counties the Buhrstone rocks are very siliceous and have resisted erosion so long that they form high rocky ridges, rising in some places 200 feet or more above the surrounding country, and known locally as "mountains."* In Butler and Crenshaw Counties can be seen another extreme of topography, flat pine woods much like some of those considerably nearer the coast.

Most of the streams are sluggish and bordered by swamps. The rivers are muddy most of the time, but the creeks and branches are of course considerably less so. Small springs are common enough, but large ones are rare, and chiefly confined to the regions of Midway

*The only railroad tunnels in the coastal plain of the United States, as far as known, are in these mountains, one in Monroe County, and one in Lauderdale County, Mississippi, which adjoins Alabama.

See also Harper 6 (111).

and Nanafalia limestone. (The Blue Spring in Barbour County is probably the largest one in the region.) The ground-water fluctuates less here than in most of the regions previously described, partly because this is nearer the coast, and partly also on account of a more evenly distributed seasonal rainfall.

Climate.—Two of the weather stations mentioned in the appendix are located in this region, namely, Pushmataha, among the mountains of Choctaw County, and Thomasville, in Clarke County. The average temperature and length of the growing season seem to differ little from those of the three or four regions last described. At Thomasville the summers are a little wetter than at any station previously mentioned, and if any data were available for the eastern half of the region they would probably show a still greater tendency in that direction.

Forest types.—The "mountains" and most of the other ridges are or have been covered with splendid long-leaf pine forests, interspersed with several upland oaks. But in Pike and Barbour Counties (as well as in the corresponding parts of Southwest Georgia) there is a belt ten or fifteen miles wide where this pine is rare or absent, for no apparent reason.* Little or none of it is visible from the railroads in Clarke and Wilcox Counties, but that is partly due to the fact that the railroads there run for considerable distances through valleys, while the pine is chiefly confined to hills. In the more hilly portions the ravines and bluffs are covered with beech, white oak, cucumber trees, short-leaf pines, etc. Some outcrops of Midway limestone, particularly in the northern part of Butler County, are said to have once supported a fine growth of cedar. The "pocosin"† in Pike County,

*Sugar-cane, which is cultivated in nearly every region where long-leaf pine grows, seems to be equally scarce in the same belt.

†Pocosin, like hammock, is a phytogeographical term used only in the coastal plain. It is most prevalent in eastern North Carolina, where it means a level area with wet sour sandy soil, sparsely wooded with pine or cypress, with a dense undergrowth of shrubs and vines, mostly evergreen (something like fig. 52 of this report). Just how the term came to be applied to such a different type of vegetation in Alabama is a mystery.

about half way between Troy and Brundidge, is a beautiful bit of virgin forest covering several hundred acres and closely resembling the sandy hammocks‡ which are common farther south. The trees in it are mostly of species which cannot stand fire, and they are protected from fire by being nearly surrounded by an area of dry sand on which the vegetation is too sparse to feed flames. The swamps vary from alluvial to non-alluvial, and each kind has its characteristic timber.

Fires are frequent on the wooded uplands, especially where long-leaf pine is the prevailing tree, but rare in the valleys, and almost impossible in ravines and swamps.

LIST OF TREES.

16-10	**Pinus palustris**	Long-leaf pine	Poorest soils
0-1	**Pinus Elliottii**	Slash pine	Low grounds
10-12	**Pinus Taeda**	Short-leaf pine	Various situations
6-4	**Pinus echinata**	Short-leaf pine	Dry soils
3-3	**Pinus glabra**	Spruce pine	Hammocks
2-2	Taxodium distichum.	Cypress	Swamps
1-0	**Juniperus Virginiana**	Cedar	Limestone outcrops
0-0	Hicoria aquatica	(Swamp) hickory	Along creeks and rivers
1-0	Hicoria alba	Hickory	Dry woods
0-0	Hicoria glabra	(Pignut) hickory	Dry woods
1-2	Salix nigra	Willow	Along streams
1-2	Populus deltoides	Cottonwood	River-banks
1-1	Carpinus Caroliniana	Ironwood	Near streams
1-1	Ostrya Virginiana		Ravines and bluffs
1-2	Betula nigra	Birch	Along creeks and rivers
3-2	Fagus grandifolia	Beech	Bluffs and bottoms
0-0	Castanea dentata	Chestnut	Becoming scarcer
0-0	Castanea pumila	Chinquapin	Dry woods
3-2	Quercus alba	White oak	Rich woods
2-1	Quercus stellata	Post oak	Dry woods
0-0	Quercus Margaretta	Post oak	Dry sand
0-0	Quercus lyrata		Alluvial swamps
0-1	Quercus Michauxii	Swamp chestnut oak	Alluvial swamps
4-3	Quercus falcata	Red oak	Dry woods
0-1	Quercus pagodaefolia		Bottoms
0-0	Quercus rubra		Ravines and bluffs
0-0	Quercus Schneckii		Bottoms
0-0	Quercus velutina	Black oak	Dry woods

‡See footnote on page 83.

LIST OF TREES.—Continued.

0-0	Quercus coccinea	Spanish oak	Dry woods
1-2	Quercus Catesbaei	Turkey oak	Dry sand
2-2	Quercus Marylandica	Black-jack oak	Dry soils
1-2	Quercus cinerea		Dry soils
2-3	Quercus nigra	Water oak	Low grounds
2-2	Quercus laurifolia		Hammocks, etc.
1-1	Quercus Phellos	Willow oak	Low grounds
0-0	Ulmus Americana	Elm	
0-0	Ulmus alata	Elm	
0-0	Planera aquatica		River-banks
1-1	Morus rubra	Mulberry	Bottoms, etc.
3-4	Magnolia grandiflora	Magnolia	Hammocks, etc.
3-4	Magnolia glauca	Bay	Non-alluvial swamps
0-0	Magnolia acuminata	Cucumber tree	Rich woods
0-0	Magnolia pyramidata	Cucumber tree	Rich woods
1-1	Magnolia macrophylla	Cucumber tree	Bluffs, etc.
4-3	Liriodendron Tulipifera	Poplar	Along branches, etc.
0-0	Persea Borbonia	Red bay	Hammocks, etc.
0-0	Persea pubescens	Red bay	Non-alluvial swamps
0-0	Sassafras variifolium	Sassafras	
4-5	Liquidambar Styraciflua	Sweet gum	Various situations
1-2	Platanus occidentalis	Sycamore	River-banks mostly
0-0	Crataegus spathulata	Haw	Dry woods
0-0	Crataegus Michauxii	Haw	Dry sand, eastward
0-0	Prunus Caroliniana		Hammocks and bluffs
0-0	Cercis Canadensis	Redbud	Rich woods
1-1	Ilex opaca	Holly	Ravines, bluffs, etc.
1-0	Acer Floridanum	Sugar maple	Ravines, bluffs, etc.
1-1	Acer saccharinum	Silver maple	River-banks
1-2	Acer rubrum	Red maple	Branch-swamps, etc.
0-1	Acer Negundo		River-banks, etc.
1-0	Tilia heterophylla ?	Lin	Rich woods
4-3	Cornus florida	Dogwood	Dry woods
1-0	Nyssa sylvatica	Black gum	Rich woods
1-2	Nyssa biflora	Black gum	Non-alluvial swamps
0-0	Nyssa uniflora	Tupelo gum	Sloughs, etc.
1-1	Oxydendron arboreum	Sourwood	Ravines and blffs
0-0	Bumelia lycioides		
0-0	Bumelia lanuginosa		Sandy hammocks
0-1	Diospyros Virginiana	Persimmon	
1-1	Halesia diptera		River-banks, etc.
0-0	Symplocos tinctoria	Sweet-leaf	Ravines and bluffs
1-0	Fraxinus Americana	Ash	Rich woods
0-1	Fraxinus Caroliniana	Ash	Swamps
0-0	Osmanthus Americana		Hammocks
0-0	Catalpa bignonioides	Catalpa	River-banks

About 47% of the trees in the original forests were evergreen. Seventeen of the species, comprising about 20% of all the trees, are oaks. This number of oaks seems to be equaled only in the short-leaf pine belt (6A); but oaks form a larger proportion of the forest in several of the regions farther inland. The most noteworthy tree reaching its inland limit in this region is *Pinus Elliottii*, the slash pine,* which is found in the southern part of Butler County, but is much more abundant in the regions farther south.

Population, etc.—At the time of the last census the southern red hill region had about 32 inhabitants to the square mile, an increase of about 12½% in ten years. About 57% of the population is white. About 60% of the region seems to be still wooded,—more in the mountainous sections than elsewhere, of course. Some of the counties have a stock law and some have not.

Forest utilization.—A great deal of the long-leaf pine has of course been cut out, but it is still the most abundant tree in the region, apparently. The short-leaf pine and a few of the oaks have spread somewhat into old fields, but otherwise the proportions of the different upland species have not changed much. From the swamps some cypress has been removed, but little other damage has been done to them. In some parts of the region which are remote from railroads, tram-roads have been built out from navigable rivers, particularly the Tombigbee, and the timber gotten out in that way. The principal forest products seem to be as follows:

Long-leaf and short-leaf pine lumber.
Naval stores.
Cross-ties (mostly pine).
Baskets, crates, veneers.
Doors, sash, blinds, mouldings, mantels.
Staves, spokes, handles.
Pine and cypress shingles (both split and sawed).
Cedar posts and pencil wood (decreasing).
Dogwood logs for shuttles.

*In the latter part of the 19th century this tree was miscalled "Cuban pine" by many writers on forestry, because it was thought to be identical with *Pinus Cubensis*, a species now believed to be confined to eastern Cuba. The name "slash pine" may not be used much in Alabama, but it is common in Georgia.

Poplar logs and lumber.
Other hardwood logs of various kinds, exported whole.
Evergreens for winter decorations.
Pine lightwood shipped to cities.
White oak cotton baskets.
Honey, persimmons, hickory nuts.

The stage of development of the lumber industry in this region is just about intermediate between that of the hardwood and the long-leaf pine regions, and in many respects pretty close to the average for the whole state. The Southern Lumberman enumerates 76 sawmills, with an average capacity of 13,900 feet a day, and 5 other wood-working establishments. Only about five of the sawmills have tram-roads (aggregating 114 miles in length), but one of these five, at Chapman, Butler County, in the flat pine woods area mentioned a few pages back, seems to be the third largest in the state. Over twenty kinds of wood are reported by the sawmills of this region. Sixty-one of them cut long-leaf pine, 52 short-leaf (of two or three species), one "spruce" (*Pinus glabra?*), 6 cypress, 8 hickory, 4 beech, 19 "white oak," 11 "red oak," 36 poplar, 2 magnolia, 8 sweet gum, and 6 ash.

The evergreen industry, which will be described more particularly under the next region, is carried on to a considerable extent in Monroe, Conecuh, Crenshaw, Barbour, Henry and perhaps a few other counties, mostly in late fall.

11. The Lime Hills.

(Figure 40.)

This division, covering about 1,300 square miles in Alabama, extends from Conecuh County northwestward into Mississippi. The red lime lands of the central part of Jackson County, Florida, which seem to extend a little way into Houston County, Alabama, are essentially the same kind of country. Farther east there is nothing exactly like it.

References.—Ball, Lyell (77), Smith 6 (62-64, 143-145, 148-149, 154-155), Smith 7 (281-285, 500-501, 503-504,

507, 515-518, 530-533), Smith 8 (107-117, 120-121, and county descriptions), Smith 9 (284-286, 298-302), Tuomey 1 (154-159), Tuomey 2 (249-252, by E. Q. Thornton).

Geology and soils.—The principal rock of this region is the Vicksburg or St. Stephens white limestone, regarded by some geologists as the uppermost member of the Eocene and by others as Lower Oligocene; a matter of classification which does not particularly concern the geographer. Some older Eocene rocks, such as Claiborne and Buhrstone, are exposed in the Hatchetigbee anticline of Choctaw, Clarke and Washington Counties, which belongs geologically with the region last described, but for geographical purposes is best included in the lime hills region, which completely surrounds it. The white limestone crops out on hillsides in many places, and is a favorite material for chimneys, on account of the ease with which it can be sawn into blocks of the desired size when freshly quarried.

The soil on the uplands is mainly a dark red loam, probably most of it residual from the limestone, rather than belonging to the Lafayette formation. Like most calcareous soils lying considerably above sea-level, it is very fertile; except that potash is a little deficient on the ridges.

The existence of deposits of salt, alkali, sulphur, etc., in this region, especially in the vicinity of the Hatchetigbee anticline, is shown by the occurrence of these substances in the water of springs and artesian wells; and there are a few places where their effects on vegetation are noticeable.

Topography and hydrography.—The topography is in general rather hilly. In some places in the vicinity of the anticline above mentioned it is almost as mountainous as in neighboring parts of the red hills region. One or two caves are reported, but there seems to be no ponds or large limestone springs, and the streams present no peculiarities worth mentioning.

Climate.—The weather records from Bermuda, Conecuh County, which is just about on the northern edge of this belt, may be taken to illustrate its climate. The av-

erage temperature is about 65°, and the average annual rainfall about 50 inches. The four warmest months get more than their share of rain, but the six warmest months get a little less. (In this and several other cases it appears that the contrast between summer and winter rainfall is better exhibited by taking the figures for four months than for six.)

Forest types.—The limestone outcrops are characterized by cedar, redbud, mulberry, and other trees that are sensitive to fire, usually draped with "moss" (*Tillandsia usneoides*). The drier uplands have various oaks, shortleaf pines, and occasionally long-leaf pine, the latter seeming strangely out of place among such dense vegetation. The forests on loamy slopes and in bottoms are mainly of the hammock type, with magnolia, beech, spruce pine, etc. Fire is infrequent.

LIST OF TREES.

10-8	**Pinus palustris**	Long-leaf pine	Dry soils
10-12	**Pinus Taeda**	Short-leaf pine	Generally distributed
3-3	**Pinus echinata**	Short-leaf pine	Dry soils
5-6	**Pinus glabra**	Spruce pine	Ravines and bluffs
2-2	Taxodium distichum	Cypress	Swamps
4-2	**Juniperus Virginiana**	Cedar	Rock outcrops
0-0	Juglans nigra	Black walnut	Limestone slopes
1-1	Hicoria aquatica	(Swamp) hickory	Along creeks, etc.
2-1	Hicoria alba	Hickory	Dry woods
1-2	Salix nigra	Willow	Along streams
1-1	Populus deltoides	Cottonwood	River-banks, etc.
1-1	Carpinus Caroliniana	Ironwood	Creek-swamps, etc.
1-1	Ostrya Virginiana		Ravines and bluffs
2-2	Betula nigra	Birch	Along creeks and rivers
4-4	Fagus grandifolia	Beech	Bluffs and bottoms
5-3	Quercus alba	White oak	Bottoms, etc.
1-1	Quercus stellata	Post oak	Dry woods
1-1	Quercus Durandii		Limestone outcrops
0-0	Quercus Muhlenbergii		Limestone outcrops
1-1	Quercus Michauxii	Swamp chestnut oak	Bottoms
2-2	Quercus falcata	Red oak	Dry woods
0-0	Quercus Schneckii		Calcareous soils
0-1	Quercus Catesbaei	Turkey oak	Sandy soils
1-1	Quercus Marylandica	Black-jack oak	Dry woods
0-1	Quercus cinerea		Sandy soils

LIST OF TREES.—Continued.

3-3	Quercus nigra	Water oak	Bottoms
2-2	Quercus laurifolia		Bluffs, etc.
1-1	Quercus Phellos	Willow oak	Bottoms
1-1	Ulmus alata	Elm	
1-1	Planera aquatica		River-banks
1-1	Celtis occidentalis	Hackberry	River-banks
2-1	Morus rubra	Mulberry	Calcareous soils
4-4	Magnolia grandiflora	Magnolia	Ravines and bluffs
2-3	Magnolia glauca	Bay	Sandy swamps
0-0	Magnolia acuminata	Cucumber tree	Rich woods
1-1	Magnolia macrophylla	Cucumber tree	Ravines and bluffs
3-3	Liriodendron Tulipifera	Poplar	Ravines and bluffs
0-0	Sassafras variifolium	Sassafras	
5-4	Liquidambar Styraciflua	Sweet gum	Various situations
2-3	Platanus occidentalis	Sycamore	River banks, etc.
2-2	Cercis Canadensis	Redbud	Rock outcrops mostly
0-0	Cyrilla racemiflora	Tyty	Creek swamps
2-2	Ilex opaca	Holly	Ravines and bluffs
0-0	Acer leucoderme?	Sugar maple	Limestone slopes
1-1	Acer saccharinum	Silver maple	River-banks
0-1	Acer rubrum	Red maple	Branch-swamps
1-1	Acer Negundo		Along creeks and rivers
0-0	Tilia heterophylla?	Lin	Limestone slopes
1-1	Aralia spinosa	Prickly ash	Limestone slopes
3-2	Cornus florida	Dogwood	Dry woods
0-0	Nyssa sylvatica	Black gum	
1-2	Nyssa biflora	Black gum	Non-alluvial swamps
1-1	Oxydendron arboreum	Sourwood	Ravines and bluffs
0-1	Diospyros Virginiana	Persimmon	
0-0	Halesia diptera		Limestone slopes, etc.
0-0	Symplocos tinctoria	Sweet-leaf	Ravines and bluffs
0-0	Fraxinus Americana	Ash	Rich soils
0-0	Osmanthus Americana		Ravines and bluffs
0-0	Catalpa bignonioides	Catalpa	Creek-banks, etc.
0-0	Viburnum rufidulum	Black haw	Dry woods

About 44% of these trees are evergreen, which is rather a high figure for such a calcareous region.

Economic features.—Notwithstanding the fertility of the soil, probably at least two-thirds of the area is still wooded, partly because the roughness of the topography interferes somewhat with agricultural operations, and apparently also because this region is considered less salubrious than most of the non-calcareous parts of the

state. The long-leaf pine is not abundant enough or accessible enough to invite extensive lumbering operations, but some turpentine was made from it in Choctaw County as long ago as before the war, it is said. The magnolia, poplar, spruce pine, and a few other species are being made into baskets and crates at Evergreen, and considerable quantities of short-leaf pine lumber and white oak staves are gotten out in many places. Cedar is cut for posts and doubtless also for pencil wood.

Excluding the large mill at Jackson, which must get most of its timber from other regions farther up the Tombigbee River, the Southern Lumberman lists nine mills from this region, with an average capacity of 9,555 feet a day, and no tram-roads. Eight of them cut long-leaf pine, 8 short-leaf, 2 cypress, 2 hickory, 5 white oak, 3 red oak, 7 poplar, 2 sweet gum, and 2 ash.

The evergreen decoration industry deserves special mention. Although the proportion of evergreen trees is not as large here as in adjacent regions, if the pines are left out and shrubs and vines taken into consideration there are few regions which surpass this in number of evergreens. Mr. G. W. Caldwell* began shipping evergreens, principally wild smilax, for decorative purposes from Evergreen about 25 years ago, and since then the industry has grown to large proportions, and spread to several other counties. Most of the plants utilized in this way are shrubs and vines, but branches of such trees as long-leaf pine, magnolia and holly also make up a considerable proportion of the shipments.

*See bibliography.

12. The Lime-Sink Region.

(Figures 41, 42.)

The region just described passes eastward into one with similar geological characters but very different soil, topography and vegetation, which may be called the lime-sink region, as it is a direct continuation of a region so named in Georgia. About 1,300 square miles of it is in Alabama and still more in West Florida and Southwest Georgia.

References.—Smith 6 (65, 153, 157-158), Smith 7 (287, 527, 538-541), Smith 8 (117-119, 667, 675-676, 681), Smith 9 (249, 259, plate 17A).

Geology and soils.—The underlying formation of this region is mainly the Vicksburg, as in the last, but the original limestone has been very largely replaced by silica, so that the rocks are mostly flinty or cherty. (It is barely possible that the wetter summers and sandier soil eastward may have something to do with this.) Over it nearly everywhere is several feet of mottled sandy clay, probably Pliocene, and on top of that in most places a foot or so of whitish sand, presumably still more recent. A tolerably pure limestone crops out in a few spots, however, mostly on the banks of creeks. The sandy soil was almost hopelessly sterile by ante-bellum standards, but in these days of commercial fertilizers, when ease of cultivation is about the best quality a soil can have, it is enjoying great popularity, and being appropriated by farmers very rapidly.

Topography and hydrography.—The topography is more nearly level than that of most of the regions previously described. Shallow ponds, most of which are dry for a few weeks or months each year, are very common. Streams are not well developed, and a good deal of the drainage is subterranean (not as much so in Alabama, however, as in the corresponding parts of Georgia and Florida). A few caves and big springs are known, and lime-sinks (an illustration of one of which is referred to above) are a very characteristic though rather uncommon feature of this region. One essential topographic

difference between this region and that next to be described is that here some comparatively level areas are bordered by low hills, while in the next, on leaving a plain, other than a river-terrace or flood-plain, one always goes down hill.

Climate.—No accurate climatic data from this part of the state seem to be available yet. Its temperature doubtless does not differ essentially from the average between the regions on either side of it, and, the summers are evidently somewhat wetter than the winters.

Forest types.—The greater part of this region was originally covered with an open forest of long-leaf pine, carpeted with wire-grass and other narrow-leaved herbs, from which this region derives its popular name of "wire-grass country." A person standing in the midst of a primeval forest of this type can usually see just about a quarter of a mile in every direction. The shallow depressions rarely contain open sheets of water, but are usually full of cypress, slash pine, black gum, mayhaw, or yaupon, or two or more of these trees together. Where the water in these depressions is never more than a few inches deep and the vegetation is dense and composed mostly of bay, tyty, or other evergreen small trees or large shrubs, they are called bays. (Bays seem to be commonest in the southern part of Covington County and neighboring parts of Florida.) The streams are nearly everywhere bordered by swamps, and the limestone outcrops usually have a rich hammock vegetation.

Fire is frequent here, as in all other long-leaf pine regions, but it rarely invades the bays, swamps, or hammocks.

LIST OF TREES.

50-35	**Pinus palustris**	Long-leaf pine	The prevailing tree
6-6	**Pinus Elliottii**	Slash pine	Ponds and bays
5-7	**Pinus Taeda**	Short-leaf pine	Swamps mostly
1-1	**Pinus serotina**	Black pine	Bays
2-1	**Pinus echinata**	Short-leaf pine	Clayey soils
1-1	**Pinus glabra**	Spruce pine	Hammocks
2-1	Taxodium distichum	(River) cypress	Swamps
6-6	Taxodium imbricarium	(Pond) cypress	Ponds mostly

LIST OF TREES.—Continued.

1-0	**Juniperus Virginiana**	Cedar	Limestone outcrops
0-0	Hicoria alba	Hickory	Clayey soils
0-0	Myrica cerifera	Myrtle	Hammocks
0-1	Salix nigra	Willow	Along rivers mostly
0-0	Carpinus Caroliniana	Ironwood	Bottoms
0-0	Ostrya Virginiana		Hammocks
0-0	Betula nigra	Birch	Along rivers mostly
1-2	Fagus grandifolia	Beech	Hammocks and bluffs
0-0	Quercus alba	White oak	Richer soils
0-0	Quercus Muhlenbergii		Limestone outcrops
0-0	**Quercus Virginiana**	Live oak	Calcareous hammocks
0-0	**Quercus geminata**	Live oak	Sandy creek banks
0-1	Quercus falcata	Red oak	Clayey soils
0-0	Quercus Schneckii		Calcareous hammocks
3-5	Quercus Catesbaei	Turkey oak	Dry sand
1-2	Quercus Marylandica	Black-jack oak	Dry clay soils
2-3	Quercus cinerea		Dry sand
0-1	**Quercus nigra**	Water oak	Creek swamps mostly
1-2	**Quercus laurifolia**		Sandy hammocks
0-0	Planera aquatica		River-banks
0-0	Morus rubra	Mulberry	Richest soils
1-2	**Magnolia grandiflora**	Magnolia	Hammocks
2-3	**Magnolia glauca**	Bay	Bays and swamps
0-0	Magnolia pyramidata	Cucumber tree	Bluffs along rivers
1-1	Liriodendron Tulipifera	Poplar	Branch-swamps
1-2	Liquidambar Styraciflua	Sweet gum	Various situations
0-0	Platanus occidentalis	Sycamore	Along rivers
1-1	Crataegus aestivalis	May-haw	Shallow ponds
0-0	Prunus serotina	Wild cherry	Hammocks
0-0	Cercis Canadensis	Redbud	Limestone outcrops
2-2	Cyrilla racemiflora	Tyty	Creek swamps
0-1	**Cliftonia monophylla**	Tyty	Bays
2-2	**Ilex opaca**	Holly	Hammocks and bluffs
1-2	**Ilex myrtifolia**	Yaupon	Shallow ponds
0-0	**Ilex vomitoria**		Hammocks
1-1	Acer Floridanum	Sugar maple	Hammocks
1-2	Acer rubrum	Red maple	Branch-swamps
0-0	Aralia spinosa	Prickly ash	Hammocks
1-1	Cornus florida	Dogwood	Dry woods
2-3	Nyssa biflora	Black gum	Swamps and ponds
0-0	Nyssa uniflora	Tupelo gum	Sloughs, etc.
0-0	Bumelia lanuginosa		Sandy hammocks
0-0	Bumelia lycioides		Limestone outcrops
0-1	Diospyros Virginiana	Persimmon	Various situations
0-0	Halesia diptera		Sandy banks, etc.
0-0	**Osmanthus Americana**		Hammocks
0-0	Catalpa bignonioides	Catalpa	River-banks

About 75% of the trees in the original forests were evergreen.

Long-leaf pine of course makes up most of this figure, but there are more broad-leaved evergreen trees here than in any region farther inland, with the possible exception of the lime hills. No other division of the state, except the next one, has so many species of pine. There are ten oaks, but they seem to have made up only about 7% of the original forests. They are of course now relatively more abundant since so many of the pines have been cut away, and some of them may have also increased in absolute abundance.

One tree which occurs in this list and not in any of the preceding ones is *Taxodium imbricarium*, the pond cypress.* The same would be true of its associate the slash pine, but for the fact that a little of that grows in Butler County, in region no. 10. Other trees which appear for the first time in this list are the two live oaks, the May-haw, the evergreen tyty, and the yaupon; though the last four are often nothing but shrubs.

Population, proportion of forest remaining, etc.—Unless there is some serious error in the census figures or in the author's calculations, there were in this region in 1910 about 50 inhabitants to the square mile, an increase of nearly 60% in ten years. Over three-fourths of the population is white. It seems strange that a region where agriculture is still comparatively in its infancy can support so dense a population. The paradox is doubtless partly, though not wholly, explained by the presence of several small cities such as Dothan, Hartford and Florala, which draw part of their support from other regions. Another circumstance to be considered is that nearly all the farmers are white, and they probably cultivate the land more intensively and can therefore live closer together than do those in some of the old agricultural regions where large plantations and negro labor are the rule.

*It extends considerably farther inland in some of the states farther east, however.

The region is being settled up so rapidly that it is difficult to get a reliable estimate of the relative proportion of forest and clearing, but it is probably safe to say that at least half of the area has not yet felt the plow. Most of the long-leaf pine has been removed or culled, however, although a few fine stands of virgin timber can still be seen, especially in Covington County. The topography offers no appreciable obstacle to lumbering operations, so that when railroads once entered the region the destruction of forests was very rapid. In the earlier periods of agricultural development, when pine timber was worth considerably less than it is now, and much of it was too remote from railroads to be marketed profitably, thousands of the finest trees were deadened to make room for crops, and their decaying trunks standing like gaunt sentinels in the fields are still a melancholy sight in this and adjoining regions, for the practice has not entirely ceased yet.

This region and the next are about the only parts of Alabama where long-leaf pine fuel is still used as motive power for passenger trains; and the growing scarcity of timber will probably banish the picturesque wood-burning locomotive and its resinous aroma from our state entirely (except on logging roads, etc.) within a very few years.

Cattle still have free range in all the counties.

Forest products.—The production of lumber, shingles, cross-ties, naval stores, etc., from the long-leaf and slash pine overshadows all other forest industries in this region. Some of the cypress has been cut for telephone poles and cross-ties, and the best of the very scattered cedars have already gone to the pencil mills, but the hardwoods are still almost untouched, except such upland oaks as have been destroyed in clearing the land. About 5% of the wood-working industries of the state, other than turpentine stills, sawmills, cross-tie camps, etc., are located in this region.

Although no statistics for earlier periods are accessible at the present writing, it is pretty evident that the lumber industry has declined rapidly here in the last decade or two, probably more so than in any other part

of the state. If we leave out of consideration the largest mill in the state, which although it draws some of its timber from this region is located in the next, there are listed from this region in the Southern Lumberman's directory only 10 sawmills, with an average capacity of 9,300 feet a day. The largest one cuts 25,000 feet a day, and has 7 miles of tram-road. If we assume that half the timber for the big mill at Lockhart (mentioned on page 121) comes from the lime-sink region, and count that mill as one, the average capacity for the region would be nearly doubled. All the mills cut long-leaf pine, 3 short-leaf pine, and 3 poplar. In the last decade of the 19th century there must have been nearly as many sawmills in proportion to area in this region as in that next to be described, but now the farmers have almost put the lumbermen out of business.

13. Southwestern Pine Hills.

(Figures 43-48.)

This attractive region, covering about 5,000 square miles in Alabama, extends from near the Savannah River in Georgia through West Florida to southern Mississippi, and reappears in Louisiana.

References.—Bartram, Mohr 3 (525, 527, 529-530), Mohr 5 or 6 (38-39), Mohr 8 (110-124, 125-127, 822), Smith 6 (64-67, 154-158), Smith 7 (285-293, 529-540), Smith 8 (98-99, 101-107, 681-687, 690-704; some of this by L. C. Johnson), Smith 9 (22-24, 250-251, 302-316), Tuomey 2 (148-149), Stelle. Also U. S. soil surveys of Baldwin and Mobile Counties.

Geology and soils.—The oldest strata exposed in this region are mottled clays and coarse loamy cross-bedded sands, with various shades of pink, yellow, purple, etc., all essentially non-calcareous and devoid of fossils. Much of this material is indistinguishable, to the naked eye at least, from the strata underlying the long-leaf pine hills of the central pine belt (region 6B), although it is supposed to be not older than Pliocene, and therefore very much younger than the central pine belt. On top of this

heterogeneous material in many places is a few feet of brick-red loam referred to the Lafayette, and over that sometimes sand of still later age.*

Both superficial formations (if such they are) may be absent, however,—as appears to be the case over the greater part of Washington County—without making much difference in the vegetation; perhaps because all are equally deficient in lime and potash. Where the older formation comes to the surface the uppermost few inches are usually more sandy than the rest, this difference being presumably due to weathering, assisted by vegetation and copious summer rains.

Pebbles similar to those in the central pine belt occur in the variegated material and sometimes higher up, but they are less abundant than in the Tuscaloosa formation. In some of the more hilly portions, especially a few miles west of Bay Minette, the hillsides are strewn with blocks and plates of coarse blackish ferruginous sandstone, exactly like that already described for region 6B. (In both regions it is a favorite material for the construction of chimneys in the rural districts.) Mud is almost as scarce as lime in this region, so that traveling in wet weather is much less disagreeable here than it is in some regions farther inland.

Topography and hydrography.—The topography differs little from that produced by normal erosion. In most places it is undulating, with streams well developed, and valleys 10 to 50 feet deep. Some of the smaller valleys are rather narrow and V-shaped, while the other extreme, best developed in Washington County, is broad and savanna-like, with the surface perpetually moist, and ventilated by crawfish-holes. The hills are smooth and rounded, except in the rocky places, and the highest are about 350 feet above sea-level. In the southern part of Clarke County the small remnant of this kind of country between the two large rivers stands so high and has been so deeply dissected by erosion that the topography is as

*Some geologists now regard both the red loam and the sand as mere products of weathering from the material below, but there seems to be about as much evidence against this hypothesis as there is in favor of it.

rugged as in the central long-leaf pine hills previously described. (The vegetation too is almost identical.)

Flat areas are chiefly confined to uplands remote from streams, where the original level surface of the sedimentary deposits has been scarcely affected by erosion as yet. One such area traverses the center of Baldwin County from north to south, with a gentle slope southward. It is rather narrow at Bay Minette, but widens considerably southward, where the lower altitude gives the streams less eroding power. Along some of the rivers and on the west side of Mobile Bay there are level areas probably of the nature of terraces, backed by low hills. (The monotonous flat country which borders the coast of South Carolina, Georgia and East Florida, extending over 50 miles inland in some places, has no counterpart in Alabama, where undulating hills come right down to tide-water, or break off in high bluffs, as on the east side of Mobile Bay.) In both kinds of flat areas there are many shallow ponds much like those in the lime-sink region previously described. Salamander hills are fairly common east of the Tombigbee River, but are not known west of there, either because the animal that makes them (*Geomys Tuza*) has never been able to cross that river, or because the soil is not sandy enough for it there, or both.

The streams traversing this region may be divided into three classes: (1) the large rivers, such as the Alabama and Tombigbee, which originate outside of the coastal plain and are always muddy, and fluctuate considerably with the seasons; (2) rivers like the Conecuh, Pea and Choctawhatchee, which rise in the older parts of the coastal plain and always carry some mud in suspension and some lime in solution, but fluctuate less than those in the first class; (3) still smaller streams, most of them no larger than creeks, which originate within the pine hills region. The last-named are usually coffee-colored from peaty matter in solution and suspension, almost free from lime, mud, and other mineral substances, and not subject to much fluctuation. Every stream is bordered by more or less swamp, but the three kinds of swamp show important differences in vegetation.

The water of springs and wells in the superficial clays and sands of this region and adjacent parts of Florida is exceptionally pure.

Climate.—The climatological data for Citronelle, Flomaton, Daphne and Mobile show that this region has an average temperature of about 67° and a growing season of about 270 days. The rainfall is not only heavier than in other parts of the state (about 59 inches annually), but, what is probably equally important to the vegetation, the summers are decidedly wetter than the winters, a fact which tends to keep the ground-water level more constant than it is elsewhere, and retards the processes of soil weathering to some extent.

Forest types.—As in the region last described, the greater part of the area has been covered with open park-like forests of long-leaf pine, subject to frequent fires which tend to keep down underbrush. The herbaceous vegetation of these forests is as characteristic as the pines. Near some of the streams, especially in their forks and on bluffs, where fire is practically barred, the forests are of the hammock type. Of the three kinds of swamps above mentioned, the non-alluvial peaty ones bordering the smaller streams are much the most numerous. The vegetation of shallow ponds is much like that of similar habitats in the lime-sink region.

LIST OF TREES.

70-50	**Pinus palustris**	Long-leaf pine	Always in sight
4-6	**Pinus Elliottii**	Slash pine	Ponds and swamps
2-3	**Pinus Taeda**	Short-leaf pine	Creek bottoms, etc.
0-0	**Pinus serotina**	Black pine	Non-alluvial swamps
1-1	**Pinus echinata**	Short-leaf pine	Richer uplands
0-1	**Pinus glabra**	Spruce pine	Hammocks and bluffs
0-0	Taxodium distichum	(River) cypress	Larger swamps
3-5	Taxodium imbricarium	(Pond) cypress	Ponds, etc.
1-1	**Chamaecyparis thyoides**	Juniper	Non-alluvial swamps
0-0	Hicoria aquatica	(Swamp) hickory	Muddy swamps
0-0	Hicoria alba	Hickory	Richer uplands
0-0	Hicoria glabra	(Pignut) hickory	Dry woods

LIST OF TREES.—Continued.

1-1	**Myrica cerifera**	Myrtle	Hammocks, etc.
0-0	Salix nigra	Willow	Along rivers
0-0	Carpinus Caroliniana	Ironwood	River bottoms, etc.
0-0	Ostrya Virginiana		Bluffs, etc.
0-0	Betula nigra	Birch	Along rivers
0-0	Fagus grandifolia	Beech	Bottoms
0-0	Quercus alba	White oak	Bottoms
0-0	Quercus stellata	Post oak	Dry woods
0-0	Quercus Margaretta	Post oak	Dry sand
0-0	Quercus lyrata		Muddy bottoms
0-0	Quercus Michauxii	Swamp chestnut oak	Muddy bottoms
0-0	**Quercus geminata**	(Scrub) live oak	Dry sandy banks
1-1	Quercus falcata	Red oak	Clayey uplands
2-3	Quercus Catesbaei	Turkey oak	Sandy pine woods
2-3	Quercus Marylandica	Black-jack oak	Dry soils
1-2	Quercus cinerea		Pine woods
0-1	Quercus nigra	Water oak	Creek swamps, etc.
0-0	**Quercus laurifolia**		Hammocks
0-0	Quercus Phellos	Willow oak	Bottoms
1-2	**Magnolia grandiflora**	Magnolia	Hammocks
2-3	**Magnolia glauca**	Bay	Non-alluvial swamps
1-2	Liriodendron Tulipifera	Poplar	Branch-swamps
0-0	**Persea pubescens**	Red bay	Non-alluvial swamps
1-2	Liquidambar Styraciflua	Sweet gum	Various situations
0-0	Platanus occidentalis	Sycamore	River-banks
0-0	Crataegus viridis	Haw	Muddy swamps
0-0	Crataegus aestivalis	May haw	Shallow ponds
0-1	Cyrilla racemiflora	Tyty	Branch-swamps, etc.
1-2	**Cliftonia monophylla**	Tyty	Non-alluvial swamps
0-1	**Ilex opaca**	Holly	Hammocks
0-0	**Ilex myrtifolia**	Yaupon	Shallow ponds
0-0	**Ilex vomitoria**		Hammocks
0-1	Acer rubrum	(Red) maple	Swamps
0-0	**Gordonia Lasianthus**		Non-alluvial swamps
0-0	Aralia spinosa	Prickly ash	Hammocks
1-2	Cornus florida	Dogwood	Dry woods
2-3	Nyssa biflora	Black gum	Ponds and swamps
0-0	Nyssa uniflora	Tupelo gum	River-swamps
0-0	Oxydendron arboreum	Sourwood	Bluffs and hammocks
0-0	Batodendron **arboreum**	Sparkleberry	Sandy hammocks, etc.
0-0	Diospyros Virginiana	Persimmon	
0-0	Halesia diptera		Sandy banks
0-0	Symplocos **tinctoria**	Sweet-leaf	Hammocks
0-0	**Osmanthus Americana**		Hammocks

According to the above figures about 35% of the species and 84% of the individual trees in the original forests were evergreen. The oaks, although of more than a dozen species, make up even less of the total forests than they do in the lime-sink region, and other deciduous trees are equally scarce. The difference between the summer and winter aspects of the forests is therefore not very striking.

One noteworthy tree which in Alabama is confined to this region is the juniper, *Chamaecyparis*. It grows near the coast as far north as New Hampshire, but there are some large gaps in its range, especially in Georgia. Wherever it is found it seems to indicate exceptionally pure water. Some of Mobile's water-supply comes from swamps in which this tree grows (as is true also of Brooklyn, N. Y.). *Gordonia Lasianthus*, a bay-like tree so rare in Alabama that the natives do not seem to have any name for it, also appears for the first time in this list. It is more common in Georgia and North Carolina.

Population, etc.—Excluding Mobile County, which contains a city built up largely by foreign trade and therefore to a large extent independent of the natural resources of the surrounding country, this region had in 1910 only about 15 inhabitants to the square mile, two-thirds of them white. This was an increase of about 45% in ten years. For the last 25 years or so the increase of population in this region and in the corresponding parts of Georgia, Florida and Mississippi has been almost without precedent in the eastern United States. Some of the counties have just about doubled in population. This rapid increase has boosted the price of land inordinately, and today the average price of the once despised poor sandy pine land in this and the adjoining lime-sink region is actually higher than that of some in the black belt, once regarded as the most desirable farm land in the whole state. As yet probably not more than 25% of the area is under cultivation, but the pine forests have been cut over again and again, so that the present stand of timber must be considerably less than half of what it was originally.

Some of the gloomy predictions made in the last century with reference to the forests of this region have not been realized, however. Dr. Mohr, in his valuable report on the forests of Alabama in the 9th volume of the Tenth Census (Mohr 3 in bibliography), writing in 1880, expressed himself as follows:

"A quarter of a century ago a pine forest, unequaled in the magnificence of its tree growth, and supposed at that time to contain an inexhaustible supply of timber, covered Baldwin County through its whole extent. Today this forest, from the line of the Mobile and Montgomery Railroad, along the eastern shore of Mobile Bay, and along all the water-courses as far as Bon Secours Bay, upon the Gulf, is entirely destroyed, and presents a picture of ruin and utter desolation painful to behold."

"The mills situated on Perdido River and Bay depend entirely for their present and future supply of logs upon this forest of southern Baldwin County, although I learn that it is expected to supply them during the next five years only, even if their production of lumber does not increase."

"The first turpentine distilleries were established on the Gulf coast a little more than a quarter of a century ago, along Fish River on the eastern and Dog River on the western shores of Mobile Bay. The business soon assumed such proportions as to lead to the destruction of the forests covering hundreds of square miles, particularly in Baldwin County. The production of naval stores in this county, as well as in the lower part of Mobile County, has at present nearly ceased, on account of the exhaustion of the forest."

Smith and Johnson, writing of Washington County in 1894 (Smith 7 in bibliography), say:

"The lands generally lie well, and though sandy seem to produce remunerative crops. However there can be no just appreciation of the agricultural capabilities of a county, where all the skill and energy of the people are invested in the primitive forest. The principal business of the county is to destroy the forest. Every creek and branch that at high water can float a log is utilized for 'logging'; and where the timber is too far from water, or from a railroad, the people engage in 'turpentining'. (The destruction must go on.) The waste from 'boxing' is greater than from 'logging'; for in getting out timber for the mills the small trees are spared and may benefit another generation; but in the process for obtaining the turpentine trees of all sizes are attacked; all die together, all get burnt up together."

These accounts were written with all sincerity and truthfulness, and abundant examples of the destruction thus described can be seen in the same region today; and yet the pine forests are not all gone yet. Over 25 years

after Dr. Mohr wrote as above, sawmills of the largest type were in operation along the railroads in Washington, Mobile and Baldwin Counties, and some of them are still running. As for turpentine, one of the largest stills ever erected in the state is operating in the southern part of Baldwin County at the present writing (1912), and small ones are not uncommon.

In making the prophecies above quoted a few facts were not taken sufficiently into consideration. One seeing trees cut down at a rapid rate can easily imagine that it will take only a few years to devastate a whole county; but Baldwin County alone covers a million acres, and if this were all pine forest, and if 100 acres were cleared every working day in the year, it would take about 30 years to denude the whole county, even if no young trees came up to take the place of the old ones. The reproductive powers of the long-leaf pine are greater than some have realized, too. In spite of too frequent fires, it continues to take possession of cut-over land in this region, producing trees large enough for turpentining in about 25 years, and for lumber in 50 or 60, until the farmer finally stops it.

The last-named contingency is what is happening at the present time. The cut-over pine lands of Mobile and Baldwin Counties are being rapidly settled by farmers, largely from Michigan and other states in that part of the country, and the amount of land on which timber is allowed to grow is steadily decreasing.

Open range for cattle still seems to be the rule in all this region, but as soon as the cultivated area equals half of any one county there will probably be a demand for stock laws.

Forest exploitation and products.—Although the average capacity of the sawmills of this region, and the total capacity in proportion to area and population, seems to be exceeded a little by two or three of the regions covering less than 1,000 square miles each, and the total number of mills is less than in regions 6A and 10, this is in many ways the principal lumbering region of the state. The Southern Lumberman has collected information from 57 mills, with an average capacity of 37,000 feet a

day, and 12 other wood-working establishments. Over one-third of the mills have tram-roads, averaging about 20 miles in length, and making in all 424 miles of logging railroad, which is about as much as in all the rest of the state combined, and averages about one mile to every 12 square miles. The largest mill in the state, with a capacity of 275,000 feet of lumber a day, is located at Lockhart, Covington County, and there are four or five others which can cut as much as 100,000 feet a day, and at least 20 that cut as much as 50,000. Nearly all the mills cut long-leaf pine, and many cut little else, except that they probably take slash pine wherever they can get it, without reporting it separately. Twenty-eight of them cut "short-leaf pine" (which may include some *Pinus Elliottii*, too), 11 cypress (probably of both species), 4 juniper, 3 white oak, 3 red oak, 14 poplar, and 4 sweet gum.

Most of the mills are of the "big mill" type, with an endless chain arrangement for carrying slabs out to one side and dropping them into a fire, and many of them have artificial ponds into which the logs are dumped from the cars and allowed to float there until the mill is ready for them. This custom of soaking the logs in water for a few days or weeks before sawing seems to be much less prevalent east of Alabama than westward. Likewise the former practice of digging small canals for long distances, lining them with boards, and turning enough water into them to float logs to the mill, a method which has now been almost entirely superseded by the tram-road. The methods of transporting logs from the stump to the tram-road or stream or artificial waterway also vary considerably from one place to another. The enormous two-wheeled log-cart, which can ride right over small logs without much difficulty, is perhaps the commonest device for this purpose, but in some places, especially westward, carts with four, six or eight small wheels are now preferred. Steam skidders are used to a limited extent, more for swamp timber than for pine, however.

Naval stores are produced from the long-leaf and slash pines at numerous turpentine stills, all of which look very

much alike, and their style probably does not change much from one decade to another. This industry seems to be in the hands of a comparatively few men, who are born to the business, as it were, and migrate from place to place as one crop of trees after another becomes exhausted. The method of taking the crude gum from the trees has changed considerably in the last ten years, however, largely owing to the genius and foresight of Dr. Charles H. Herty. Up to 1902 the practice of cutting a "box" at the base of each tree to catch the gum that trickled down the scarified face was universal throughout our coastal plain. About that time, though, Dr. Herty substituted for the wasteful and debilitating "box" an earthenware cup hung on a nail, and conducted the gum into it by means of two inclined galvanized iron gutters.

This innovation was not received very enthusiastically at first, but it now yields a handsome royalty to the inventor, and the old method of "boxing" is almost abandoned. Besides Dr. Herty's method there are at least a dozen modifications or imitations of it in use at the present time. All of these methods tend not only to increase the flow of gum and the quality of it, but also to prolong the life of the tree, especially by reducing the chances of its being broken off at the base by the wind.

A few plants for the distillation of turpentine and various other products from pine stumps have been erected in this part of Alabama and the corresponding parts of other states, but somehow they do not always prove successful.

The leading wood products of this region are lumber (and its various derivatives such as flooring, laths, shingles, doors, sash, blinds, crates, etc.), cross-ties and fuel, nearly all from the long-leaf and slash pines. The use of wood for locomotive fuel has already been mentioned under the preceding region. (In both regions very little coal is used outside of the larger cities.) Minor industries based on the same woods are the manufacture of paving blocks, excelsior and furniture at Mobile. Cypress and juniper are worked up into poles, piles, and

shingles, more rarely into cross-ties, and some of the hardwoods into veneers, baskets, chairs, etc.

About 18% of the state's industrial plants for the utilization of trees (not counting those producing nothing but rough lumber or naval stores) are in this region. But many of them of course are in Mobile, where considerable quantities of timber from other regions and even from foreign countries are brought in. The rivers which empty into Mobile Bay penetrate all the divisions of the coastal plain, railroads radiate out from Mobile in several directions, and steamers come in from many Gulf and Caribbean ports.

14. The Mobile Delta.

(Figures 49, 50.)

From the confluence of the Alabama and Tombigbee Rivers to the head of Mobile Bay, a distance of about 30 miles in a straight line or about twice as far by water, extends a swampy region covering about 300 square miles, which is essentially a delta, though narrower in proportion to length than most deltas, on account of being hemmed in by hills on both sides. It is almost completely surrounded by the southwestern pine hills, and if it was considerably smaller it might be regarded merely as one of the forest types of that region. But it has some peculiarities which are due much more to its proximity to the coast than to the nature of the adjacent country, so that it seems best to treat it as a separate and distinct region. Its nearest counterpart is probably in the swamps at the mouth of the Apalachicola River, which have recently been described by the writer.*

References.—Mohr 3 (525-527), Mohr 8 (124-125, 127-128), Smith 6 (66-67), Smith 7 (290-292), Tuomey 2 (151).

Geology and soils.—The soil of the delta is alluvium of unknown depth, doubtless coarsest in the immediate vicinity of the stream channels, and more or less peaty in the interstream areas. It ought to be well supplied with all the essential elements of fertility.

*Third Ann. Rep. Fla. Geol. Surv. 235-237; Torreya 11:225-234. 1911.

Topography and hydrography.—The whole area of course lies close to sea-level, with a gradual ascent to the northward. At any particular latitude the banks of the channels are the highest points, and at the upper end of the delta these may be 15 or 20 feet above sea-level. The channels form an intricate network, and the largest ones are the Mobile River on the west side and the Tensas (or Tensaw) on the east. Both are navigable, but the Mobile River is the principal one used by steamboats going up into the interior. The water is always more or less muddy, but it cannot fluctuate much with the seasons, on account of its nearness to the Gulf. At the head of the bay or mouth of the rivers the seasonal fluctuation is of course almost nothing, or less than the semi-diurnal tidal fluctuation, while at the head of the delta the river may rise as much as 10 or 15 feet, and the tide is perceptible only when the water is pretty low.

Climate.—The climatic data for Mobile, at the southern end of the delta, are probably sufficiently representative for the whole area, and these can be found in the appendix. As far as the water-level in the swamps is concerned, that of course depends less on local climatic conditions than on the rainfall in the interior of the state.

Forest types.—It has been found that the amount of seasonal fluctuation of water is a factor of fundamental importance to swamp vegetation; and the local distribution of trees in the delta can be correlated best with this factor. Near the mouths of the rivers several trees abound which are totally absent from the alluvial swamps farther inland, but are common enough in the non-alluvial swamps of smaller streams in the neighboring pine hills. At any given latitude in the delta the seasonal fluctuation is greatest along the channels, and the trees more characteristic of alluvial swamps reach their coastward limits in such situations. At the very extremity of the delta, where the seasonal fluctuation is negligible, conditions are unsuitable for trees, and the vegetation is mostly marsh instead of swamp; perhaps because trees cannot germinate in soil perpetually submerged.

The following trees were observed on July 21 and 22, 1911, and June 16, 1912, along the L. & N. R. R., which crosses the delta close to its lower end. Upstream the forests of course gradually assume the character of ordinary alluvial swamps, so that a section a few miles higher up would give a somewhat different analysis.

LIST OF TREES.

30-10	Taxodium distichum	Cypress	Common
8-11	Salix nigra	Willow	Mostly in open places
5-7	Populus heterophylla	Cottonwood	
0-1	Ulmus Americana	Elm	
13-16	**Magnolia glauca**	Bay	Common
0-0	**Persea pubescens**	Red bay	
6-8	Liquidambar Styracif : a	Sweet gum	
5-7	Acer rubrum	(Red) maple	
27-34	Nyssa biflora	Black gum	Common
2-2	Nyssa uniflora	Tupelo gum	Along main channels
2-2	Fraxinus sp.	Ash	

There are only two evergreens, the bays, which are estimated to have made up 13% of the original forests in the lower parts of the delta. Pines and oaks are both absent, the soil being probably too rich for the former and too wet for the latter. Most of the trees visible from the railroad, especially the black gum, have rather crooked trunks, more so than the same species in other habitats. This feature together with the density of the forest reminds one a good deal of some tropical forests.

Economic features.—The delta is too wet for cultivation and permanent human habitations. so that at least 99% of it is still covered with forests. A great deal of the cypress and some of the tupelo gum and a few other trees has been cut out, the cypress mostly for shingles. Cigar-boxes are said to have been made from the tupelo gum in Mobile, and the chair-factory there probably draws a good deal of its raw material from this same region. The cutting of timber is done mostly when the water is highest, and the logs then floated out.

Five of the sawmills located at tide-water in Mobile County, with an average capacity of 40,000 feet a day,

cut cypress and tupelo gum, doubtless derived mostly from the delta. Two of these same mills also cut cottonwood (probably two species), 3 sweet gum, and 2 ash.

15. The Coast Strip.
(Figures 51-53.)

In some places the pine forests of region 13 come to within a few feet of tide-water, as if the sea had been encroaching on the land very recently; but there are many places in the two maritime counties where other types of vegetation, not belonging to that region, intervene between the long-leaf pine forests and salt water, and these must be regarded as a distinct region, though covering perhaps not more than 150 square miles in Alabama. Our coast region is part of a strip that borders the Gulf coast from the mouth of the Ocklocknee River in Middle Florida to the Pearl River in Mississippi. East of Mobile Bay it is mostly mainland, but west of there it is chiefly confined to a chain of narrow islands several miles off shore, the neighboring mainland belonging mostly to region 13.

References.—Mohr 8 (129-133), Smith 6 (66-67), Smith 7 (290-291), Tuomey 2 (148-149), and U. S. soil surveys of Baldwin and Mobile Counties.

Soil, topography, etc.—The greater part of the coast region consists of dunes of quartz sand, most of them now stationary and held together by sparse vegetation. The soil of the stationary dunes is extremely sterile, nearly all soluble matter probably having been leached out long ago, and is dazzling white in the sunshine. In the moving dunes the sand has a slight tinge of buff. Where the dunes rest on the mainland one finds behind them and among them low flat damp sandy areas supporting a slender growth of pines. On the banks of some of the bays and estuaries are mounds of oyster shells whose contents are supposed to have furnished food for some pre-historic race of men, and these mounds have some characteristic plants on them. In bays well protected from wind and fresh water there are small areas of salt marsh.

Climate.—The climate of the coast differs from that at Mobile and Daphne chiefly in the amount of wind. As on most other coasts, the wind blows pretty strongly inshore most of the time, and this is one condition that hinders the growth of trees with broad thin leaves.

Forest types.—The outer or moving dunes, as well as the salt marshes, are essentially treeless. The stationary dunes nearest the sea support a sparse growth of stunted evergreen small trees and shrubs, while some that lie a mile or so inland and are more protected from the wind have a more luxuriant vegetation of the hammock type. The damp sandy flats are mostly covered with slender slash pines and a dense growth of evergreen shrubbery, similar in aspect to the pocosins of eastern North Carolina. On the loamy shores of bays and estuaries, and especially on the shell mounds, are a few trees that prefer richer soil. Some of these last are common in the interior of the state, and some are almost confined to the coast region. Leguminous plants seem to be entirely absent from the stationary dunes, as they are from the very similar "scrub" of peninsular Florida, and from the somewhat similar "jack pine plains" of Michigan.

Fire is a negligible factor in the coast region, partly because in most places there is not enough grass to feed flames, and partly because the area is so dissected by waterways that even if a fire should start it would not be likely to spread far.

It is difficult to make quantitative estimates of the trees in such a limited and diversified area, and the percentage numbers are therefore omitted from the following lists. The principal species which attain the dimensions of trees are as follows:

Pinus Elliottii	Slash pine	Damp flats
Pinus Taeda	Short-leaf pine	Bay shores mostly
Juniperus Virginiana		Bay shores mostly
Pinus clausa	Cedar	Sheltered dunes
Hicoria glabra	(Pignut) hickory	Hammocks
Quercus Virginiana	Live oak	Bay shores mostly
Magnolia grandiflora	Magnolia	Hammocks
Liquidambar Styraciflua	Sweet gum	Bay shores mostly

In the Tennessee valley there is little uncertainty about where to draw the line between trees and shrubs, but as we go southward the difficulty of making this distinction increases. In the coast region especially there are several species which become small trees farther inland or in other states, but are here nothing but shrubs. Among them may be mentioned the following:

Myrica cerifera	Myrtle	Marshes, etc.
Quercus geminata	Live oak	Stationary dunes
Quercus myrtifolia		Stationary dunes
Cliftonia monophylla	Tyty	Damp pine flats
Cyrilla racemiflora	Tyty	Damp pine flats

Probably at least 90% of the trees of the coast region are evergreen. One species, *Pinus clausa*, is in Alabama confined to this region, and the few trees of it in the southern part of Baldwin County are the only ones known outside of Florida.

Economic features.—Practically none of the area is cultivated, and the dunes are uninhabited except for a few summer cottages, fishermen's shacks, etc. In days gone by some of the live oak was used in shipbuilding, but the forests at present seem to be of little economic importance. The cedars are mostly too gnarled or too decayed to make pencil-wood, but they may be used in a limited way for fence-posts and small parts of boats. There are no restrictions on the ranging of cattle, and small herds eke out a scanty existence on the islands, where the forage is at least green throughout the year, if nothing else.

A little honey is made in the southern part of Baldwin County, and doubtless some of it comes from the flowers of trees and shrubs growing on and near the dunes, particularly the saw-palmetto and tyty.

ILLUSTRATIONS

BARRENS OF TENNESSEE VALLEY.

(Pages 37-40.)

FIG. 1. Forest scene about four miles north of Athens, Limestone Co. Trees mostly short-leaf pine *(Pinus Taeda)*, with some red oak *(Quercus falcata)*. March 14, 1913.

FIG. 2. Damp flatwoods about six miles north of Athens. Trees mostly white oak *(Quercus alba)*. March 14, 1913.

1

2

TENNESSEE VALLEY PROPER.
(Pages 40-47.)

FIG. 3. Dry oak woods on a sort of shelf of Hartselle sandstone on east slope of Smithers Mt., Madison Co. The large tree at the right is a chestnut oak *(Quercus Prinus)*, and the others are mostly white oak *(Q. alba)*. March 16, 1913.

FIG. 4. Mountain and valley scenery between Lim Rock and Woodville, Jackson Co. (The densely wooded mountain slopes rising abruptly from cultivated level valleys are very characteristic of this county, north of the Tennessee River.) The mountain in the distance is capped with sandstone of the Coal Measures. The nearer spur is of Bangor limestone, and about half the trees on it are cedar *(Juniperus Virginiana)*. March 15, 1913.

FIG. 5. Rich woods on north slope of mountain about two miles east of Woodville. The most conspicuous trees in the picture are scaly-bark hictory *(Hicoria ovata)*, walnut *(Juglans nigra)*, elm *(Ulmus)* and lin *(Tilia)*. March 15, 1913.

3

4

5

TENNESSEE VALLEY PROPER.
(Pages 40-47.)

FIG. 6. Oak woods in rich red soil about two miles south of New Decatur, Morgan Co. Trees mostly red oak *(Quercus falcata)*. March 13, 1913.

FIG. 7. Low woods in valley of Flint Creek about three miles north of Hartselle, Morgan Co. The trees are mostly beech *(Fagus)*, but there is a large sweet gum *(Liquidambar)* near the center. March 13, 1913.

FIG. 8. Slough full of tupelo gum *(Nyssa uniflora)* about a mile from the Tennessee River in Limestone Co., opposite Decatur. March 14, 1913.

6

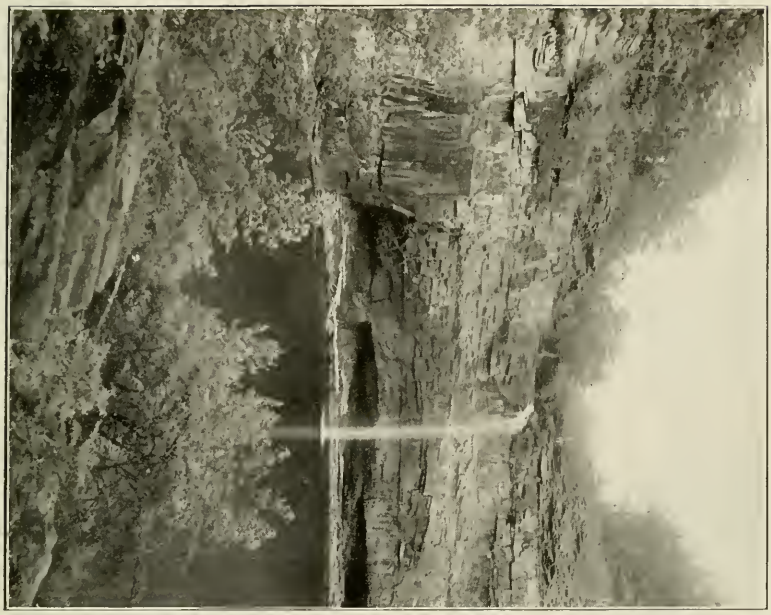
7

8

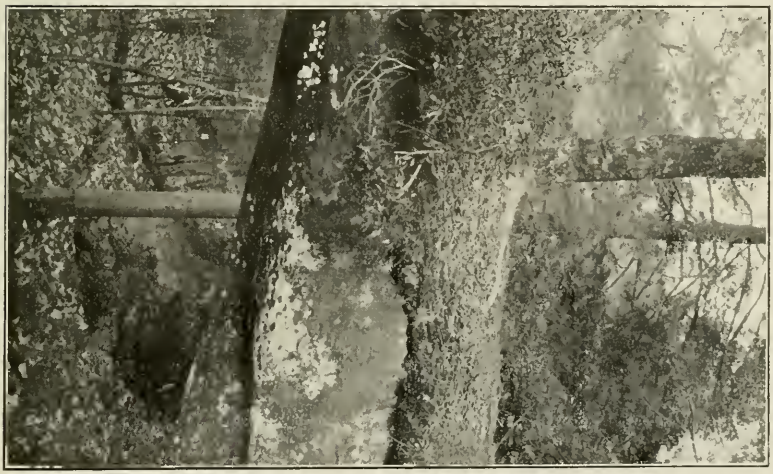
COAL PLATEAU REGION.
(Pages 47-52.)

FIG. 9. DeSoto Falls on Little River, Lookout Mountain, DeKalb Co. The rock is sandstone of the Coal Measures. (This place is mentioned several times in Mohr's Plant Life of Alabama.) Photograph by R. S. Hodges, July 26, 1904. The volume of water is doubtless considerably greater in spring.

FIG. 10. Portion of the great natural bridge of Winston Co., viewed from the head of the ravine which it spans. A beech *(Fagus)* can be seen on the bridge, and a tall hemlock or spruce pine *(Tsuga Canadensis)* in the ravine below, its top extending beyond the limits of the picture. (This is probably the first photograph of a hemlock—or a natural bridge—in Alabama ever published.) The white specks around the base of the hemlock are the large fallen leaves of the cucumber tree *(Magnolia macrophylla)*, lying upside down. November 17, 1911.



9



10

COAL PLATEAU REGION.
(Pages 47-52.)

FIG. 11. Looking south across the "gulf" on southeast side of Chandler Mt., St. Clair Co., from top of a perpendicular sandstone cliff about 100 feet high. Shows the level summit and steep slope characteristic of the plateaus of this region. September 1, 1911.

FIG. 12. Looking down gorge of Little River on Lookout Mountain from crest of the lowest falls, east of Fort Payne and about ten miles below DeSoto Falls. Shows the right or DeKalb County bank. Aug. 30, 1911.

FIG. 13. Dry woods on Sand Mountain not far from the Calvert Prong of the Locust Fork of the Warrior River, northwest of Oneonta, Blount Co. Trees mostly post oak *(Quercus stellata)*, red oak *(Q. falcata)*, and short-leaf pine *(Pinus echinata)*. May 13, 1906.

11

12

13

COAL BASIN REGION.

(Pages 52-57.)

FIG. 14. Long-leaf pine *(Pinus palustris)* forest about 4½ miles north of Jasper, Walker Co. (This is the outlying area of long-leaf pine mentioned on page 54.) April 1, 1906.

FIG. 15. Cultivated creek bottoms about half way between Oakman and Patton Junction, Walker Co., with wooded bluffs rising abruptly from them. The trees on the bluffs, especially near their summits, are mostly cliff pine *(Pinus Virginiana)*. Oct. 17, 1911.

14

15

COOSA VALLEY REGION.
(Pages 58-63.)

FIG. 16. Chert hills near Stemly, Talladega Co.; looking toward Alpine Mountain. This area was once covered with a splendid forest of long-leaf pine, the best of which has been cut off, but young trees of the same species are springing up again in abundance. May 21, 1906.

FIG. 17. Low flatwoods in Jones's Valley near McCalla, Jefferson Co. Trees mostly black gum *(Nyssa sylvatica)*, sweet gum *(Liquidambar)*, and short-leaf pine *(Pinus Taeda)*. Oct. 5, 1912.

16

17

COOSA VALLEY REGION.

FIG. 18. Cedars *(Juniperus)* on limestone outcrops in Jones's Valley between Grasselli and Wheeling, Jefferson Co. View taken from A. B. & A. R. R. embankment looking eastward toward Red Mountain. Sept. 30, 1912.

BLUE RIDGE.

(Pages 64-66.)

FIG. 19. View of the Blue Ridge from a hill about two miles north of Hollins, Clay Co. Trees mostly long-leaf pine, with some black-jack oak *(Quercus Marylandica)* in foreground. April 14, 1906.

FIG. 20. Scene on Cedar Mountain, a spur of the Blue Ridge near Pyriton, Clay Co., looking northwest toward the main ridge. In the foreground are our longest and shortest leaved pines *(Pinus palustris* and *P. Virginiana,* which do not associate in many places, because one likes fire and the other does not), and chestnut oak *(Quercus Prinus).* June 7, 1910.

18

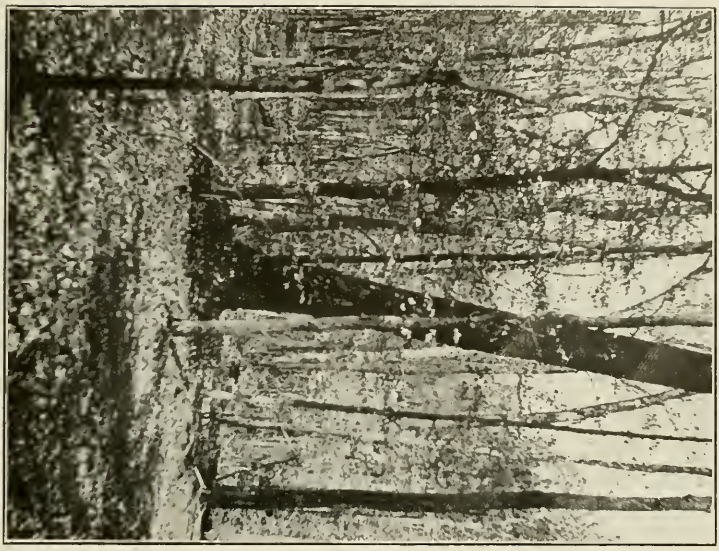
19

20

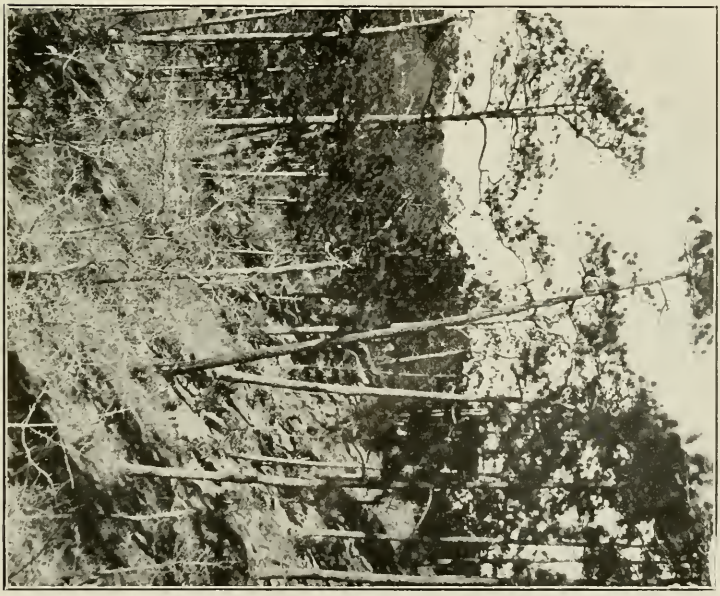
PIEDMONT REGION.
(Pages 67-71.)

FIG. 21. Dry woods about two miles north of Roanoke, Randolph Co., with long-leaf pine, dogwood (in bloom), etc. April 18, 1906.

FIG. 22. Steep hillside of rotten gneiss along Chestnut Creek about three miles below Verbena, Chilton Co., looking westward up the creek. Trees mostly long-leaf pine. February 2, 1906.



21

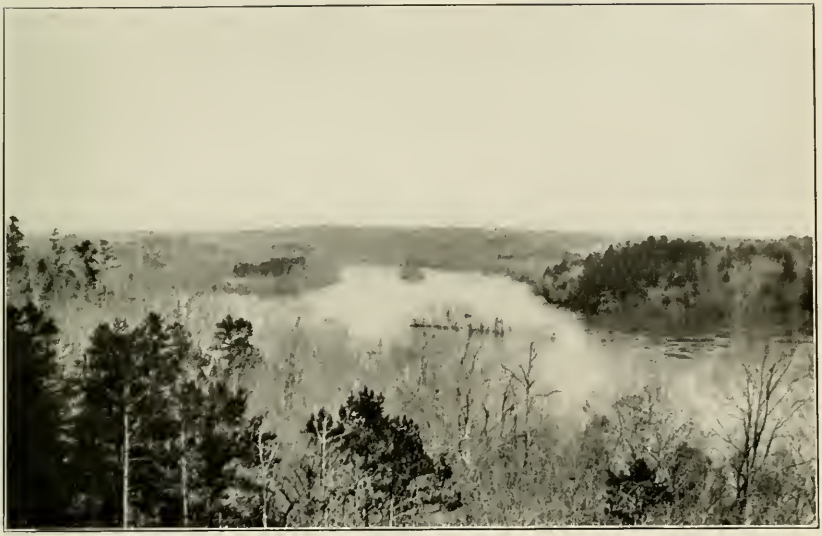


22

PIEDMONT REGION.
(Pages 67-71.)

FIG. 23. Looking up Coosa River from hills near site of proposed "Lock 12," Chilton Co. (Opposite bank is Coosa Co.) Water rather high from recent rains, so that small islands are submerged. Feb. 1, 1913. This being a winter scene gives a pretty good idea of the relative abundance of evergreens and hardwoods. The pines are mostly short-leaf *(Pinus echinata)*. (The construction of a 70-foot dam at this point, now in progress, will make great changes in this landscape, and forever destroy the opportunity for some phases of scientific research here.)

FIG. 24. Big Sandy Creek at Dadeville power-house shoals, southwest of Dadeville, Tallapoosa Co. One long-leaf pine *(Pinus palustris)* in middle of shoals, and many more on neighboring hills. (This tree can be found in similar situations in mid-stream at several places in the Tallapoosa River and its tributaries, but apparently nowhere else.) April 16, 1906.



23

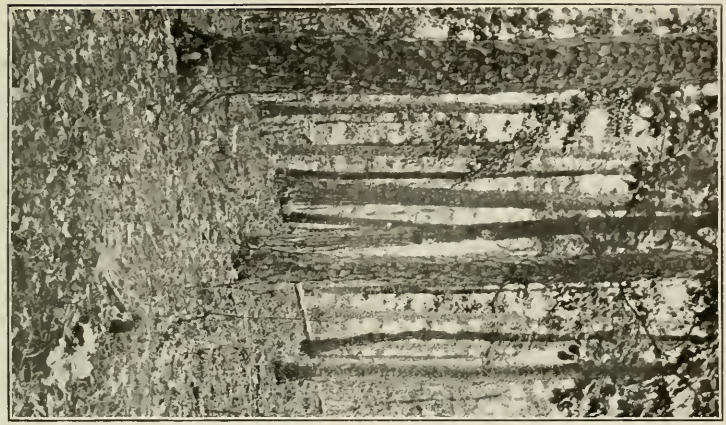
24

SHORT-LEAF PINE BELT.
(Pages 72-77.)

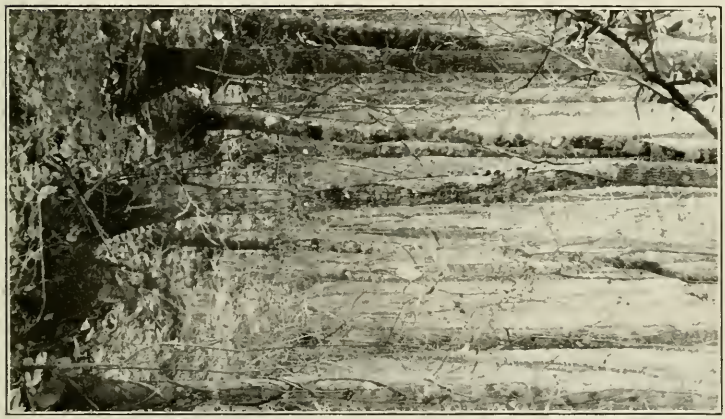
FIG. 25. Dry woods among low hills about six miles east of Tuscaloosa. Trees mostly short-leaf pine *(Pinus echinata)*, the nearest one 20 inches in diameter. A little to the right of it is a chestnut oak *(Quercus Prinus)*. Oct. 13, 1911.

FIG. 26. Non-alluvial swamp of Cribbs's Creek, about two miles south of Tuscaloosa. Trees mostly bay *(Magnolia glauca)* and black gum *(Nyssa biflora)*. Dec. 28, 1912.

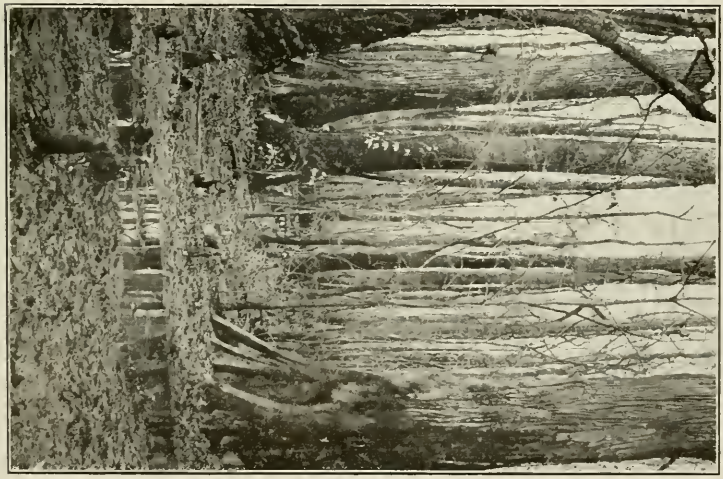
FIG. 27. Swamp of Big Creek, about four miles west of Northport, Tuscaloosa Co. Trees mostly cypress *(Taxodium distichum)* and tupelo gum *(Nyssa uniflora)*. This place is only a few miles from the Warrior River, and less than a week before it had been inundated to a depth of 13 feet (as shown by mud left on the trees) by high water from the river. March 4, 1913.



25



26



27

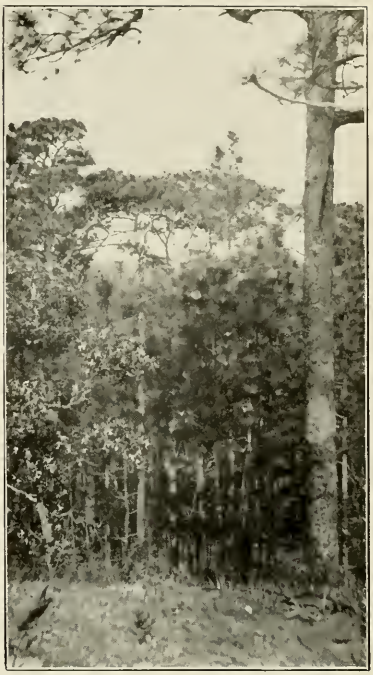
CENTRAL LONG-LEAF PINE HILLS.
(Pages 78-81.)

FIG. 28. Steep hillside with virgin forest of long-leaf pine and a little dogwood, near northeastern corner of Hale Co. May 27, 1911.

FIG. 29. Long-leaf pine *(Pinus palustris)* and turkey oak *(Quercus Catesbaei*, at left) on a high rocky hill about a mile south of Pearson, Tuscaloosa Co. May 13, 1911.

FIG 30. Summit of same hill, showing ledges of laminated ferruginous sandstone. May 13, 1911.

28



29

30

BLACK BELT.
(Pages 84-94.)

FIG. 31. Typical black belt upland scene, with whitish Selma chalk exposed in gullies, about a mile north of Emelle, Sumter Co., looking east. A few cedars *(Juniperus Virginiana)* scattered in middle distance. This area may have been partly treeless originally; but all the forest was cut away long ago, and it is now mostly pasture. Feb. 27, 1913.

FIG. 32. Exposure of Selma chalk with abundance of small cedar trees, about a mile southwest of Epes, Sumter Co. April 15, 1913.

FIG. 33. Oak woods in rich soil derived from the Selma chalk, about a mile north of Panola, Sumter Co. Evergreens are entirely absent, probably because the rich soil enables the hardwoods to monopolize the situation. Feb. 26, 1913.

31

32

33

BLACK BELT.
(Pages 84-94.)

FIG. 34. Hardwood forest in very rich bottom-land near Bodka Creek, about seven miles south of Geiger, Sumter Co. The largest and commonest tree in the picture is hackberry *(Celtis)*. Sycamore *(Platanus)* and box elder *(Negundo)* are also present, and some grape vines *(Vitis)* are visible. Feb. 27, 1913.

POST OAK FLATWOODS.
(Pages 95-97.)

FIG. 35. Post-oak flatwoods near Curl, Sumter Co. Trees mostly short-leaf pine *(Pinus echinata)* and post oak *(Quercus stellata)*. The best pines have been cut out. Feb. 28, 1913. This is probably the first photograph of the vegetation of this region ever published.

SOUTHERN RED HILLS.
(Pages 97-103.)

FIG. 36. Looking southeast across valley of Bogue Loosa Creek in the "mountains" of Choctaw Co., at Land, a new flag station about two miles south of West Butler, on a railroad that has been in operation only about a year. Trees in foreground mostly short-leaf pine *(Pinus echinata)*. The nearest house has a chimney of Burhstone, the rock which makes these mountains. Many piles of split oak stave-bolts can be seen around the settlement. In this mountain country, as in the real mountains farther inland, clearings and houses are chiefly confined to the valleys. April 17, 1913.

35

36

SOUTHERN RED HILLS.
(Pages 97-103.)

FIG. 37. Looking south across fields and hills two miles east of Troy, Pike Co. In this vicinity the uplands are nearly all under cultivation, and forests confined to narrow valleys and swamps. The most conspicuous trees are short-leaf pines. (This is in the belt in which long-leaf pine is rare or absent, mentioned on page 99.) March 27, 1913.

FIG. 38. Scene in the "pocosin" between Troy and Brundidge, Pike Co. Trees mostly evergreen oak *(Quercus laurifolia)*, with undergrowth of wild olive *(Osmanthus)* and witch-hazel *(Hamamelis)*. March 27, 1913.

FIG. 39. Flat pine woods between Yantley and Tickabum Creeks, about two miles north of Lisman, Choctaw Co. The pines are long-leaf *(Pinus palustris)* and short-leaf *(P. Taeda)* in about equal proportions. (The largest tree at the left is *P. palustris*, and the largest in the right half of the picture *P. Taeda.)* April 18, 1913.

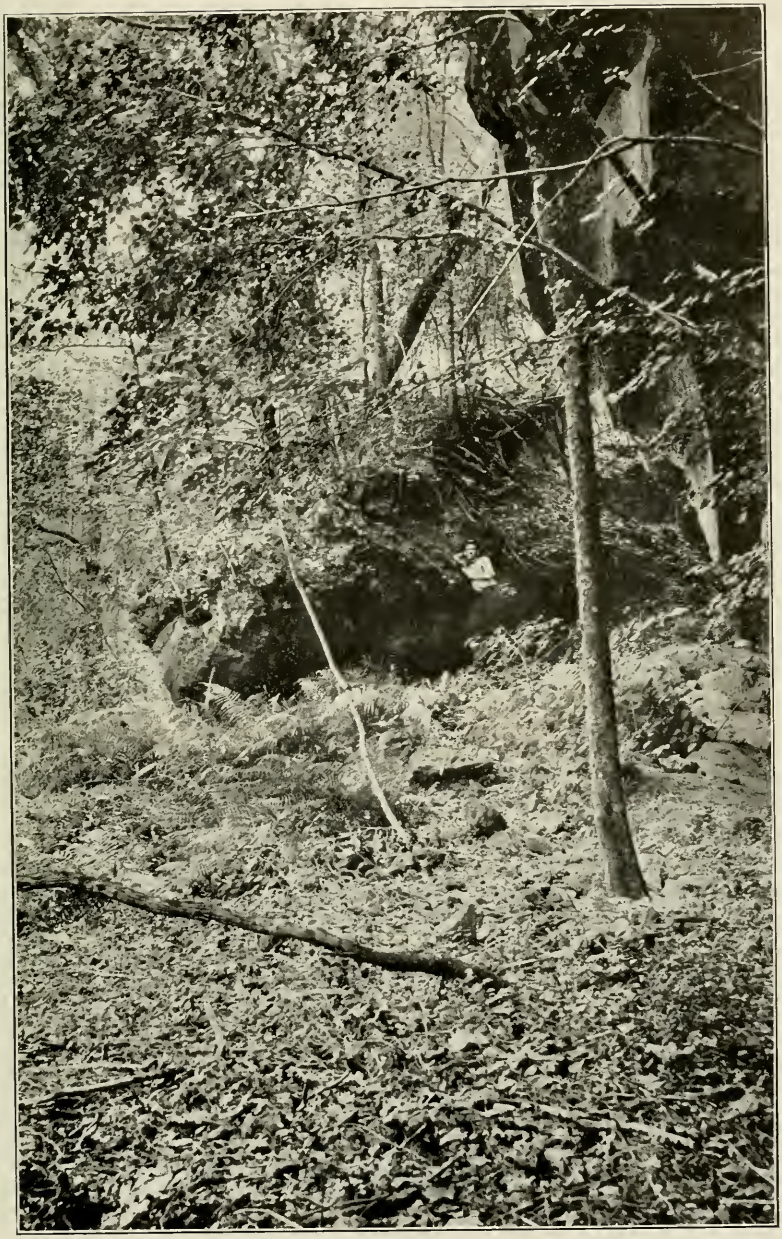
37

38

39

LIME HILLS.
(Pages 103-107.)

FIG. 40. Overhanging cliff of St. Stephens white limestone near Salt Creek, about six miles south of Jackson, Clarke Co., surrounded by luxuriant vegetation. (The plane surfaces on the cliff are where some of the rock has been sawed off in years past for building purposes.) Sept. 25, 1912.



40

LIME-SINK REGION.
(Pages 108-113.)

FIG. 41. Blue Pond, a large lime-sink holding water, in pine forests in southwestern part of Covington Co., near Dixie P. O. Photograph by Dr. E. A. Smith and R. S. Hodges, Aug. 25, 1902. (Previously published in Smith 9, plate 17A.)

FIG. 42. Shallow cypress pond near southeastern corner of Covington Co. The commonest tree is pond cypress *(Taxodium imbricarium)*, and the largest tree at the right is a slash pine *(Pinus Elliottii)*, 40 inches in diameter. The smaller growth is mostly yaupon *(Ilex myrtifolia)*. July 26, 1911.

41

42

SOUTHWESTERN PINE HILLS.
(Pages 113-123.)

FIG. 13. Looking eastward down a small dry valley in pine hills, two miles south of Bay Minette, Baldwin Co. Sides of valley unusually steep for this region, and perhaps prevented from washing into gullies by the abundance of ferruginous pebbles strewn over the surface. Trees nearly all long-leaf pine *(Pinus palustris)*; the best ones cut for lumber years ago. July 21, 1911.

FIG. 14. Savanna in pine forests in T. 7 S., R. 5 E., about seven miles west of Lillian, Baldwin Co. The trees are mostly pond cypress *(Taxodium imbricarium)* and slash pine *(Pinus Elliottii)*. Photograph by Dr. E. A. Smith and R. S. Hodges, Aug. 10, 1902. (Previously published in Smith 9, plate 22.)

43

44

SOUTHWESTERN PINE HILLS.

(Pages 113-123.)

FIG. 45. Primeval forest of long-leaf pine in T. 6 S., R. 3 E., about 25 miles south of Bay Minette and 10 miles west of Fairhope, Baldwin Co. Photograph by Dr. E. A. Smith and R. S. Hodges, Aug. 13, 1902.

45

SOUTHWESTERN PINE HILLS.
(Pages 113-123.)

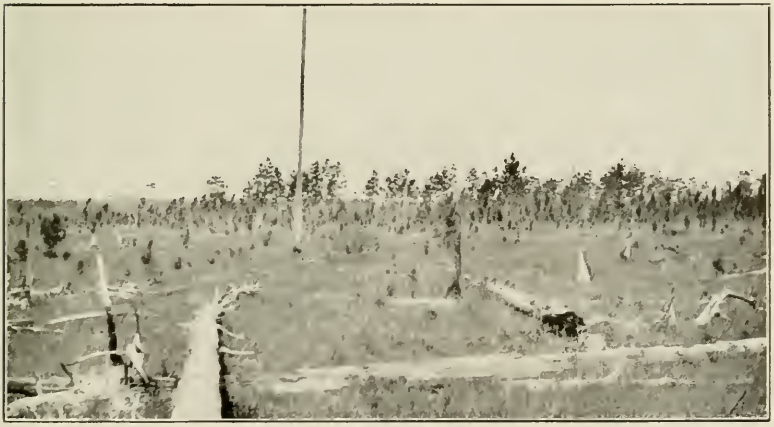
FIG. 16. Long-leaf pine forest ("round timber") near Lockhart, Covington Co., about ½ mile from the largest sawmill in the state. A few of the trees have been cut out, presumably by settlers, but otherwise the forest seems to be in its natural condition. This view illustrates the absence of underbrush and the undulating topography characteristic of this region, among other things. July 27, 1911.

FIG. 17. A scene of desolation, about four miles southeast of Grand Bay station, Mobile Co. Cut-over long-leaf pine land with almost no signs of a second crop of trees. June 15, 1912.

FIG. 18. More hopeful conditions, about a mile south of the preceding scene. Many young long-leaf pines springing up, which will make lumber for another generation if the farmers and turpentine men permit. June 15, 1912.

46

47



48

MOBILE DELTA.
(Pages 123-126.)

FIG. 49. Estuarine swamps of Tensaw River, looking north from railroad embankment near Hurricane station, Baldwin Co. Trees mostly black gum (*Nyssa biflora*). July 22, 1911.

FIG. 50. Interior of swamp near same place, same date.

49

50

COAST STRIP.
(Pages 126-128.)

FIG. 51. Scene along small salt bayou at Coden, Mobile Co. Trees mostly live oak (*Quercus Virginiana*). Photograph by Dr. E. A. Smith and R. S. Hodges, Aug. 1, 1902.

51

COAST STRIP.
(Pages 126-128.)

FIG. 52. Damp sandy pine flats about ½ mile south of Orange Beach P. O., Baldwin Co., looking seaward. Trees all slash pine *(Pinus Elliottii)*, with an undergrowth of tyty bushes *(Cliftonia* and *Cyrilla)* and other evergreen shrubbery. June 13, 1912.

FIG. 53. Scene among dunes south of Orange Beach (about opposite west end of Florida), looking east across outlet of Perdido Bay. Trees in foreground mostly scrub live oak *(Quercus geminata)*. A few slash pines in the distance. June 12, 1912.

52

53

THE TURPENTINE INDUSTRY.

FIG. 54. Turpentine negro at work in a long-leaf pine forest a few miles north of Bayou la Batre, Mobile Co. (probably near the place shown in fig. 47.) Trees "boxed" in the old barbarous way, for this was before cups and gutters were introduced in Alabama. Photograph by Dr. E. A. Smith and R. S. Hodges, July 31, 1902.

FIG. 55. Short-leaf pine *(Pinus Taeda)*, two feet in diameter, with five scarified faces for the production of turpentine, in the lime hills belt about two miles north of Millry, Washington Co. This tree is being worked by the modern cup-and-gutter method, the outfit used differing from Dr. Herty's original device only in the substitution of a galvanized iron cup for a clay pot. The attempt to extract turpentine from short-leaf pine is rather unusual, and probably not very successful. April 16, 1913.

FIG. 56. Turpentine still in the lime hills near Frankville, Washington Co. Rosin barrels at left, fuel at right. The limestone chimney is very characteristic of this region, but very unusual for a turpentine still, the vast majority of which are in regions where no such rock is to be had. Photograph by Dr. E. A. Smith and R. S. Hodges, Aug. 27, 1900.

54

55

56

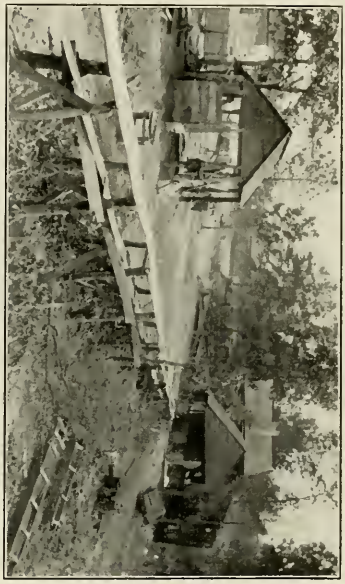
MISCELLANEOUS FOREST INDUSTRIES.

FIG. 57. Turpentine still utilizing the gum from about 10,000 "boxes"—or rather cups in this case,—southwest of Brookwood, Tuscaloosa Co. At the left is the shop where the rough pine barrels for rosin are made, a necessary adjunct of every turpentine still. Some rosin strainers are lying on the ground at the right. In the foreground is a runway on which the barrels are rolled out to the road. April 15, 1911.

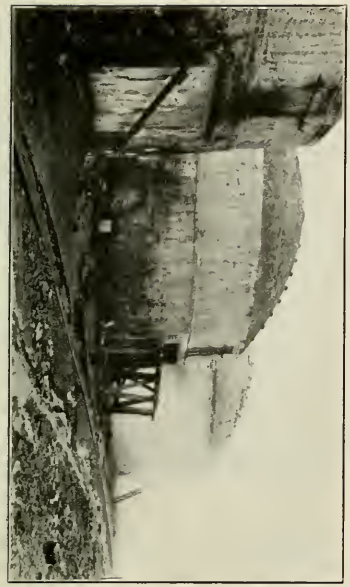
FIG. 58. Charcoal ovens at Childersburg, Talladega Co. One is being filled with wood and one is burning. Feb. 3, 1913.

FIG. 59. Cedar posts and poles awaiting shipment at Woodville, Jackson Co. March 15, 1913.

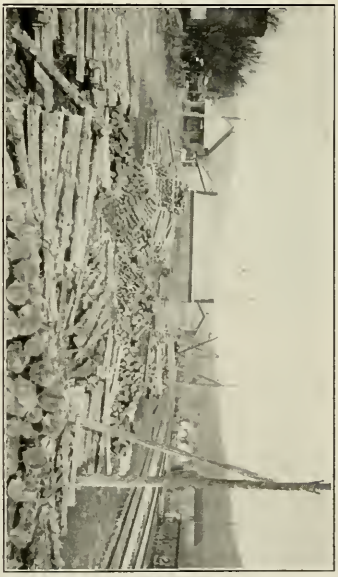
FIG. 60. Small sawmill cutting about 12,000 feet a day, of short-leaf pine and hardwoods, on L. & N. R. R. about four miles east of Tuscaloosa. Feb. 22, 1913.



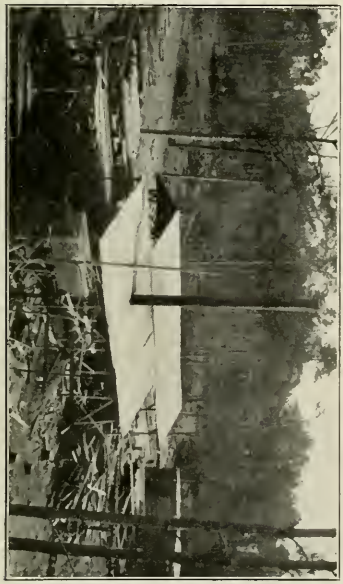
57



58



59



60

THE LUMBER INDUSTRY.

FIG. 61. Primitive log-train on tram-road with round pine logs for rails, near boundary between Covington and Escambia Cos. (near same place as fig. 41.) Photograph by Dr. E. A. Smith and R. S. Hodges, Aug. 25, 1902.

FIG. 62. Modern log-train approaching the sawmill shown in next picture. The logs are probably all long-leaf pine, as are the standing trees. July 27, 1911.

FIG. 63. The largest sawmill in Alabama (capacity 275,000 feet a day), Jackson Lumber Co., Lockhart, Covington Co. Pond in foreground into which logs are dumped from the train and soaked before sawing. Waste-burner at right. July 27, 1911. (There is a somewhat similar view of this mill in the National Magazine for July, 1911,—vol. 34, p. 438.)

61

62

63

APPENDIX A.

Scheme of Graphic Representation of Environmental Factors for the Forests of Alabama.

ON page 17 it was pointed out that the character of the forest at any place is determined by the joint action of many different factors, some more potent than others, some acting directly and some indirectly, some essentially uniform over considerable areas and some varying much in short distances, some simple and some complex. The diagram on the next page seeks to bring out some of these relations more clearly than it can be done by words alone; though of course it is still far from perfect.

For the sake of simplicity some factors whose effects are not very well understood, and some which are much less noticeable in Alabama than elsewhere, or affect herbs much more than they do trees, or do not vary enough within the limits of our state to make much difference, are omitted. (It should be borne in mind that for *geographical* purposes it is only *variable* factors that have any significance.)

Factors which vary too much in short distances to be used in defining forest regions are enclosed in dotted circles, and those which are complex, i. e., which can vary in more than one direction, are enclosed in double circles. If space permitted some of the complex factors could be separated into simple ones. For example, soil chemistry is a complex factor, because of the large number of different substances contained in soils; and if we were considering that alone we might have a separate circle for each mineral or element that is found in our soils.

A combination of a smooth and a dotted circle means that some phases of the enclosed complex factor vary greatly in short distances and some do not. In the case of topography, for example, several hills and valleys,

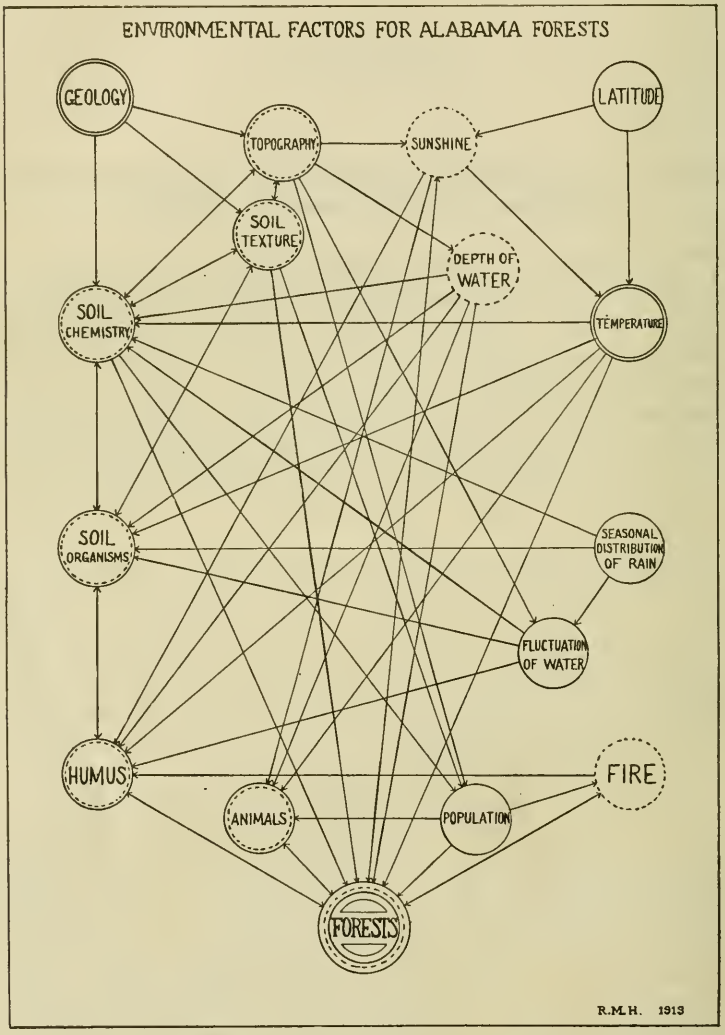


Diagram showing relations of the most important environmental factors in Alabama to the forests and to each other.

"Soil organisms" means all plants and animals, from bacteria and fungi to moles and salamanders, which live underground or in humus and have some influence on the soil. "Animals" means those which travel above ground and carry seeds or pollen, or feed on plants. "Population" refers primarily to density of population, a simple factor.

or north and south slopes, may be found on the same section of land, but a particular type of topography may prevail over hundreds of square miles.

The lines indicate the influences, and the arrows at their ends the direction of influence; and where there are arrows at both ends of a line the influence is reciprocal. For example, climatic factors evidently affect animals, while animals can hardly be said to have any influence on climate. On the other hand, the relation between fire and vegetation is reciprocal, for a forest fire could not exist without vegetation growing thickly enough for it to feed on.* Some lines representing very remote or unimportant influences are omitted, to avoid crowding the diagram too much.

Any two factors which are not directly connected are supposed to be independent of each other, or nearly so. Geology and latitude seem to be the two fundamental independent factors, and within the limits of as small a part of the earth's surface as Alabama, geology (i. e., the structure of the earth's crust) is the more important. It seems to influence nearly everything else directly or indirectly, through either topography or soil.

At some time in the not distant future it may be possible to devise formulas which will express the relative abundance of certain trees, the percentage of evergreens, or the yield of timber per acre, in terms of all these factors which can be expressed quantitatively.

*Obviously fire would be impossible in a desert, and consequently desert vegetation does not need to have any protection against it.

APPENDIX B.

Climatological Statistics.

THESE are for only a few selected stations, not more than four in any one region. They are copied or computed mostly from Bulletin W of the U. S. Weather Bureau, 1912, and from the 1911 summary of the Alabama section of the same bureau. The significance of the various columns of figures is explained on page 24.

STATIONS.	Average temperature (degrees F.)	Length of growing season (days)	Average annual precipitation (inches)	% of total annual precip. in 4 warmest mos. (Jun-Sep)	Same for 6 warmest mos. (May-Oct)
1B. TENNESSEE VALLEY					
Madison	61.0	----	49.6	31.4	46.0
Decatur	61.1	193	48.9	29.2	42.4
Florence	60.7	215	49.5	33.1	45.0
2B. COAL BASIN					
Cordova	61.4	----	53.1	33.0	45.3
3. COOSA VALLEY					
Gadsden	62.3	214	52.8	31.2	44.0
Talladega	62.9	218	49.5	32.2	44.0
5. PIEDMONT REGION					
Goodwater	62.9	234	52.1	32.8	45.0
Opelika	63.6	237	51.4	31.9	44.4
6A. SHORT-LEAF PINE BELT					
Hamilton	61.6	205	50.2	29.0	42.5
Tuscaloosa	63.1	228	49.6	31.3	42.3
6C. EUTAW BELT					
Montgomery	65.1	243	51.2	31.3	43.5
7. BLACK BELT					
Uniontown	65.0	238	48.6	33.2	45.5
Selma	64.8	240	49.6	31.0	41.7
8. CHUNNENNUGGEE RIDGE, etc.					
Fort Deposit	64.7	----	48.9	32.7	45.0
Union Springs	64.6	244	54.4	32.5	45.0
Eufaula	64.6	240	51.6	36.0	47.0
10. SOUTHERN RED HILLS					
Pushmataha	64.8	----	53.8	31.8	45.8
Thomasville	64.9	238	48.3	36.1	48.6
11. LIME HILLS					
Bermuda	64.9	----	49.9	37.0	48.8
13. SOUTHWESTERN PINE HILLS					
Citronelle	67.3	----	56.9	39.4	52.2
Flomaton	66.2	260	57.8	37.9	49.9
Daphne	67.2	277	62.0	40.0	51.6
Mobile	66.1	279	62.0	40.0	51.6

APPENDIX C.

List of Alabama Trees.

THIS list shows all the native trees mentioned in the than four in any one region. They are copied or whole state, except for a few species that are very rare or imperfectly understood. The number prefixed to each name indicates the approximate relative abundance of the species at the present time, expressed in percentages to the nearest integer. This list will be of interest chiefly to botanists, and the common names are omitted to make room for brief statements of the local distribution and habitat of each species. Other persons who may desire to connect these technical names with the corresponding common names can look them up in the index, which will refer back to one or more pages on which the common name of the species is given.

7	Pinus palustris	Poor soils, mainly southw'd and e.-ward
1	" Elliottii	Sandy swamps and ponds, sou.-most co's
8	" Taeda	In various situations, throughout
0	" serotina	Sandy swamps & bays, mostly s.e.-ward
4	" echinata	Widely distributed in dry soils
1	" glabra	Hammocks in southern half of state
1	" Virginiana	Rocky hills, northern half of state
0	" clausa	Old dunes, Baldwin County
0	Tsuga Canadensis	Ravines, etc., in plateau region
1	Taxodium distichum	Swamps, nearly throughout the c. plain
1	" imbricarium	Ponds & savannas in southernmost co's
0	Chamaecyparis thyoides	Non-alluvial swamps, s.-w. pine hills
2	Juniperus Virginiana	Rock outcrops, especially limestone
0	Juglans nigra	Richest soils, mostly northward
0	Hicoria aquatica	Muddy swamps in coastal plain
1	" ovata	Rich bottoms, etc., mostly northward
1	" alba	Dry woods, widely distributed
0	" glabra	Dry woods, widely distributed
0	" microcarpa ?	Chert ridges, Jefferson County
3	Salix nigra	Along stream, most abundant northw'd
0	Populus deltoides	River-banks, etc., mostly in coastal plain
0	" heterophylla	Mobile delta
1	Carpinus Caroliniana	Creek bottoms, etc., widely distributed
0	Ostrya Virginiana	Rich woods and bluffs, nearly throughout
2	Betula nigra	Along creeks and rivers, " "
0	" lenta	Sandstone cliffs in mountains

3	Fagus grandifolia	Rich woods, common except near coast
0	Castanea dentata	Among hills, mostly northward
0	" pumila	Dry woods, rather rare
2	Quercus alba	Moderately rich soils, throughout
2	" stellata	Dry woods, nearly throughout
0	" Margaretta	Sandy soils in coastal plain
0	" Durandii	Mostly in calcareous soils
0	" lyrata	Muddyswamps&bottoms, mostly c. plain
1	" Prinus	Rocky slopes, mostly in hill country
0	" Muhlenbergii	Mostly in calcareous soils
1	" Michauxii	Bottoms, mostly in coastal plain
0	" Virginiana	Mostly along coast and in calcareous soils
0	" geminata	Sterile sand in southernmost counties
3	" falcata	Dry woods, nearly throughout
0	" pagodaefolia	Bottoms, mostly in coastal plain
0	" velutina	Dry woods, mostly in hill country
0	" rubra	Rich woods and bluffs, mostly northward
0	" Schneckii	Flatwoods, bottoms, and calcareous soils
1	" coccinea	Dry woods, mostly northward
1	" Catesbaei	Dry sandy soil in coastal plain
2	" Marylandica	Driest soils, mostly clayey, throughout
1	" cinerea	Sandy soils, mostly in coastal plain
2	" nigra	Low grounds, nearly throughout
1	" laurifolia	Mostly in coastal plain hammocks
1	" Phellos	Bottoms and flatwoods, mostly northw'd
0	Ulmus Americana	Bottoms, etc.
1	" alata	Bottoms, etc.
0	" fulva	Richest soils, especially calcareous
0	" serotina	Rich woods, mostly in coal basin
0	Planera aquatica	Banks of larger rivers in coastal plain
0	Celtis occidentalis	River-banks, etc.
1	Morus rubra	Bottoms and other rich soils
1	Magnolia grandiflora	Hammocks in southern half
4	" glauca	Non-alluvial swamps, mostly in c. plain
0	" acuminata	Ravines and bluffs
0	" tripetala	Rich woods
0	" pyramidata	Bluffs, etc., mostly in coastal plain
1	" macrophylla	Ravines and bluffs
3	Liriodendron Tulipifera	Damp woods and ravines, throughout
0	Asimina triloba	Bottoms; usually only a shrub
0	Persea Borbonia	Bottoms in coastal plain
0	" pubescens	Non-alluvial swamps, mostly in c. plain
0	Sassafras variifolium	Bluffs; and spread'g abundantly in fields
4	Liquidambar Styraciflua	In various situations, throughout
2	Platanus occidentalis	Banks of streams; s.-ward on rivers only
0	Amelanchier Canadensis	Ravines and bluffs
0	Malus angustifolia	Dry woods, mostly clay soil
0	Crataegus spathulata	Dry woods, mostly clay soil
0	" viridis	Muddy bottoms
0	" Michauxii?	Sandy soils in coastal plain
0	" Crus-galli?	Calcareous soils, mostly in black belt
0	" aestivalis	Shallow ponds in southernmost counties
0	Prunus Americana	Rich woods, mostly northward
0	" umbellata	Dry woods
0	" serotina	Bluffs; and spreading to roadsides, etc.
0	" Caroliniana	Mostly in coastal plain hammocks

1	Cercis Canadensis	Dry or rich woods, especially calcareous
0	Gleditschia triacanthos	Tennessee valley mostly
0	Cladrastis lutea	Bluffs of Tennessee and Warrior Rivers
0	Robinia Pseudacacia	Mostly on mountain slopes
0	Cotinus Americanus	Limestone slopes, Madison County
1	Cyrilla racemiflora	Mostly in creek swamps in coastal plain
0	Cliftonia monophylla	Non-alluvial swamps in sou.-most cos.
1	Ilex opaca	Ravines, bluffs, hammocks, etc.
0	" myrtifolia	Shallow ponds in southernmost counties
0	" vomitoria	Coastal plain hammocks; usually shrubby
0	" decidua	Muddy bottoms; usually a shrub
0	Acer Saccharum?	Rich woods, northward
0	" leucoderme	Bluffs, etc., mostly northward
0	" Floridanum	Bluffs, etc., mostly southward
1	" saccharinum	Along the larger rivers
3	" rubrum	Branch-swamps, etc., throughout
0	" Negundo	Banks of creeks and rivers
0	Aesculus octandra	Rich woods, in Tennessee valley
0	" Pavia	Rich woods; common, but usually shrubby
0	Tilia heterophylla?	Rich woods
0	Gordonia Lasianthus	Non-alluvial swamps in south'nmost cos
3	Cornus florida	Dry woods, common throughout
1	Nyssa sylvatica	Commonest northward
2	" biflora	Swamps and ponds, mostly in c. plain
1	" uniflora	Swamps and sloughs, mostly in c. plain
1	Oxydendron arboreum	Ravines, bluffs, etc.
1	Batodendron arboreum	Dry woods and bluffs; usually a shrub
0	Bumelia lanuginosa	Sandy hammocks mostly
0	" lycioides	Calcareous soils mostly
1	Diospyros Virginiana	Various habitats, perhaps not native
0	Halesia Carolina	Rich woods, mostly northward
0	" diptera	Sandy hammocks, etc., southward
0	Symplocos tinctoria	Ravines, bluffs, hammocks, etc.
0	Fraxinus Americana	Rich woods, etc.
0	" quadrangulata	Limestone outcrops mostly
0	" Caroliniana	Swamps, mostly in coastal plain
0	Osmanthus Americana	Hammocks, mostly in coastal plain
0	Catalpa bignonioides	Banks of rivers and large creeks
0	Viburnum rufidulum	Dry and moderately rich woods

This list contains the names of 121 species, 8 of which are pines and 22 oaks. (Considering the percentage figures, it will be seen that the pines and oaks each constitute about 20% of the present forest wealth of Alabama.) It is probable that the total number of species, excluding numerous recently described forms of *Crataegus* which can be distinguished only by taxonomic specialists, will reach 140 or 150 when the state is thoroughly explored. The percentages of evergreens total about 33.

APPENDIX D.

Statistics Illustrating Present Condition of the Forests, Rate of Exploitation, etc., by Regions.

THE subjoined table is compiled mainly from the Southern Lumberman's 1912 directory of Alabama sawmills, described on page 32. It is somewhat similar to one published in the Southern Lumberman for April 5, 1913 (Harper 8 in bibliography), but goes into a little more detail in the treatment of geographical divisions, and differs in a few other ways. In order to minimize errors due to the possible incompleteness of the directory, or to the inaccuracy of the writer's computations, no absolute figures are given, except for areas, which are easily verified. Everything else except the density of population and capacity of the sawmills is expressed in percentages, the accuracy of which is not affected so much by incompleteness of the data. Regions less than 800 square miles in extent, and containing less than ten reported sawmills, are omitted from this table, because a small error in the absolute figures for them would make too much difference in the relative figures.

The table is divided by a double vertical line into two parts, of five columns each, besides the names of the regions. The first column of figures gives the areas, in square miles, and the second the estimated percentage of woodland at the present time. The third gives the density of population according to the census of 1910 (making some allowance for our three largest cities), and the fourth the percentage of increase of population from 1900 to 1910. The fifth column gives the average daily capacity, in thousand feet board-measure, of the sawmills enumerated by the Southern Lumberman.

The second half of the table shows the ratio between each region and the whole state, in each of five different things; and if all the regions were represented in this table each of these last five columns would add up to 100%. Column 6 is for area, 7 for amount of woodland, 8 for population, 9 for number of sawmills, and 10 for total capacity of the sawmills.

If the state were absolutely homogeneous and the regions were mere arbitrary or political divisions, differing only in size, the number of inhabitants, sawmills, etc., the amount of woodland and of timber cut, in each region would theoretically be proportional to its area, and the last five columns would then be exactly alike. But as it is, the geographical diversity of the regions is faithfully reflected in the differences between figures on the same line in different columns in the right half of the table.

In almost very case where the figure in column 8 is larger than the corresponding one in column 6 that in column 7 is smaller, and vice versa; because the denser the population the fewer the trees, other things being equal. The numerical relations of columns 9 and 10 are not so simple, but of course in general the number of mills increases with the population, up to a certain point, while the total production depends to a considerable extent on the amount of woodland, and therefore tends to decrease before the number of mills does; although a rapid increase of population in a wooded region requires a large supply of lumber for the construction of new buildings.*

The reasons for excluding Jefferson County and the city of Mobile from the computations of population, and the mills at Prentice, Jackson and Lockhart from some of the figures for sawmill capacity, have been given under the regional descriptions to which they belong.

*If it were not for the rapid increase of population characteristic of most parts of the United States our per-capita consumption of lumber would be considerably less, a fact which is not always taken into consideration in comparing the rate of destruction of our forests with that in European countries where the population, although much denser, is almost at a standstill.

REGIONS	Area (square miles)	Percentage of woodland	Inhabitants per square mile	Increase 1900-1910	Capacity of mills	RELATIVE				
						Area	Woodland	Population	No. of mills	Total capacity
1b. Tennessee valley	4100	40	53	11	9.2	8.0	5.2	9.8	8.1	4.7
2a. Plateau region	3100	75	30	37	6.6	6.1	7.4	4.8	2.7	1.2
2b. Coal basin	3300	80	40	38	12.9	6.5	8.4	6.6	3.6	2.9
3. Coosa valley	4000	55	---	---	12.1	7.8	7.0	---	11.7	8.8
Excluding Jefferson Co.	---	---	54	14½	---	---	---	---	---	---
5. Piedmont region	5000	55	40	10½	7.3	9.8	8.7	10.5	8.0	3.5
6a. Short-leaf pine belt	5100	75	30	22	15.0	9.9	11.9	7.6	20.3	18.9
6b. Central long-l. pine hills	850	87	?	?	40.0	1.6	2.2	?	3.0	7.6
6c. Eutaw belt	1500	67	?	?	13.6	2.9	3.1	?	4.4	3.8
7. Black belt	4300	25	49	*	13.4	8.4	3.5	10.0	3.7	3.0
8. Chunnennuggee Ridge	2300	50	41	*	10.4	4.5	3.6	5.2	4.0	---
Exclud'g mill at Prentice	---	---	---	---	8.7	---	---	---	3.9	2.1
10. Southern red hills	8000	60	32	12½	13.9	15.6	15.1	12.9	12.9	11.1
11. Lime hills	1300	67	?	?	---	2.5	2.7	?	1.7	---
Exclud'g mill at Jackson	---	---	---	---	9.5	---	---	---	1.5	0.9
12. Lime-sink region	1350	60	50	58	---	2.6	2.6	3.2	1.8	2.0
Exclu'g mill at Lockhart	---	---	---	---	9.3	---	---	---	1.7	1.0
13. Southwestern pine hills	5100	80	27	---	37.0	10.0	12.7	7.2	9.6	22.1
Excluding Mobile	---	---	18	45	---	---	---	4.9	---	---
The state	51279	62	42	17	16.1	100	100	100	100	100

*Decrease.

A few of the significant features of this table will now be briefly indicated.

Region 7 has the smallest proportion of woodland, 1B next, and 8 third; these being the leading agricultural regions of the state. No. 3 is the most densely populated, however, probably on account of having so many rail-

roads and manufacturing towns in proportion to area, but 1B is a close second, with 7 and 12 not far behind. Next to the two almost uninhabited regions, 14 and 15, which are not mentioned in the table, 6B, 2B, 13, 2A and 6A have the most forest and the sparsest population, approximately in the order named.

The number of sawmills per square mile is greatest in the three divisions of the central pine belt, 6A to 6C, and least in 7, 2A and 2B. In proportion to amount of woodland, however, mills are most numerous in 6A, 3 and 1B, and least in 2A, 2B and 11. In proportion to population the number of mills is greatest in 6B, 6A and 13 (excluding Mobile), and least in 7, 12 and 2B. The total capacity of sawmills in proportion to area, amount of woodland, and population is greatest in 6B, next in 13, third in 6A, and least in 2A. (Region 9 would doubtless figure in most of the sentences of this paragraph as having a well-developed sawmill industry in proportion to population if it was large enough for any accurate calculations to be made for it.)

In general the fundamental cause of the difference in degree of development of the lumber industry in different parts of the state can be traced back pretty directly to geology and soil, although some other more or less independent factors influence the problem to some extent, as already pointed out in some of the regional descriptions.

Although the statistical tables a few pages farther on (Appendix E) give lumber production only for the whole state, a rough approximation to the output for each region may be obtained by multiplying the total quantity or value by the percentages in the last column of the foregoing table, for it is reasonable to assume that in a given area the total production of lumber is proportional to the aggregate capacity of the sawmills. It would hardly be worth while to try to estimate the output of any particular species in each region in this way, though, for the relative abundance of the species varies too much in different regions.

APPENDIX E.

Statistics of Alabama Forest Products.

THE following statistics have been extracted from various recent publications of the U. S. Census Bureau and U. S. Forest Service. They are all for the whole state, no figures for separate counties, much less for regions, being available. County statistics would be somewhat misleading, anyway, for a great deal of timber is sawn, dressed, or still further elaborated in a different county from that in which it grew.

Dressed and manufactured lumber.—The first two tables are compiled from the paper on the wood-using industries of Alabama by Harris and Maxwell, cited in the bibliography. The figures are not copied directly from this paper in every case, but have been re-computed so as to exclude timber brought in from other states and countries. They show the amount of timber manufactured into something more elaborate than rough lumber, laths and shingles (therefore excluding not only the crude product of the small sawmill but also posts, poles, cross-ties, fuel, etc.), classified first by kinds of timber and then by products. The values given are those of the rough lumber as it arrives at the mill where it is dressed and manufactured, and not those of the finished product, which may be many times greater. These values represent mainly the cost of logging, sawing into planks or bolts, and transportation to the finishing mill. (Some industries, especially those which use hardwood or make veneers or excelsior, receive their timber in the form of round logs, and eliminate the preliminary sawing.)

The average value of each kind of wood can be obtained if desired by dividing each total value by the corresponding quantity given in the same line. Statistics of wood industries have not yet been gathered as systematically and thoroughly as have those of agricultural products or

even of minerals, and no doubt some important items have been omitted. These omissions however will probably diminish in number in future statistics of this kind.

TABLE 1. WOOD USED IN 1910, CLASSIFIED BY SPECIES.

COMMON NAMES	TECHNICAL NAMES	Thousand feet used	Value
Long-leaf pine Slash pine	Pinus palustris Pinus Elliottii	450,000	$5,300,000
Short-leaf pine (including loblolly)	Pinus Taeda, echinata	168,000	1,940,000
Spruce pine	Pinus glabra (and others?)	630	9,500
Cypress	Taxodium distichum, imbricarium	1,620	24,300
Cedar	Juniperus Virginiana	80	1,900
Hickory	Hicoria	5,280	111,000
Cottonwood	Populus deltoides, heterophylla	482	9,108
Beech	Fagus grandifolia	315	3,250
Chestnut	Castanea dentata	67	1,050
White oak	Quercus alba, etc.	12,000	240,000
Post oak	Quercus stellata, etc.	860	16,400
Red oak	Quercus falcata, etc.	5,600	95,000
Willow oak	Quercus Phellos, etc.	125	2,600
Elm	Ulmus Americana, etc.	570	8,490
Hackberry	Celtis occidentalis, etc.	50	750
Magnolia	Magnolia grandiflora	515	5,225
Bay	Magnolia glauca	148	1,643
Poplar	Liriodendron Tulipifera	12,000	185,000
Sweet gum (red gum)	Liquidambar Styraciflua	17,500	200,000
Sycamore	Platanus occidentalis	7	70
Haw	Crataegus	10	150
Maple	Acer	25	430
Dogwood	Cornus florida	450	6,390
Black gum	Nyssa sylvatica, biflora	486	5,120
Tupelo gum	Nyssa uniflora	7,500	80,000
Persimmon	Diospyros Virginiana	326	4,900
Ash	Fraxinus Americana, etc.	1,800	38,500
All others		60	900
Total		690,000	$8,400,000

The fact that lumbermen recognize fewer species of trees than botanists do, and often apply the same common name to two or more distinct species, is and always will be a source of some confusion in such statistics as this.

TABLE 2. SAME CLASSIFIED BY PRODUCTS.

NAME OF PRODUCT	Thousand feet used	Value
Flooring, ceiling, interior finish, etc.	554,388	$6,500,000
Sash, doors, blinds, columns, scrolls, etc.	65,183	850,000
Boxes, crates, baskets, etc.	21,510	232,000
Cars (including repairs to same)	18,294	350,000
Vehicles and parts (especially spokes)	7,381	176,000
Excelsior	5,700	45,450
Chairs	4,801	67,000
Cigar-boxes (mostly tupelo gum)	3,150	29,600
Agricultural implements	2,450	50,000
Furniture (including kitchen cabinets)	2,420	33,500
Handles (mostly of hickory, and for axes)	1,275	26,500
Sporting and athletic goods	1,152	26,800
Shuttles and picker-sticks	775	11,000
Store and bank fixtures	720	20,000
Ships and boats	511	7,715
Woodenware, etc.	303	3,460
Coffins and caskets	300	4,800
Miscellaneous	125	3,000
Total	690,000	$8,400,000

Cooperage stock, a very important item in this state, is not included in the above table, but some statistics of this industry for 1909 will be found a little farther on.

Rough lumber, etc.—The next table is compiled from two publications of the U. S. Census Bureau, namely, Bulletin 77, on lumber and timber products for 1905, a quarto published in 1907, and "Forest products of the United States, 1909," an octavo bulletin without a number, prepared in co-operation with the U. S. Forest Service, and published in 1911. It shows the quantity and value of rough lumber, laths and shingles, produced in Alabama in the years named. No indication is given of how much of the wood, if any, grew outside of the state, but timber, especially pine, is not usually hauled very far before it is sawed, and the quantity brought in from other states to mills near the border is probably just about balanced by that hauled across the state line a short distance in the other direction.

TABLE 3. LUMBER, LATHS AND SHINGLES PRODUCED IN 1905 AND 1909.

COMMON NAMES	TECHNICAL NAMES	1905		1909	
		Thousand feet	Value	Thousand feet	Value
Pine	Pinus	1,116,118	$11,320,909	1,506,863	$20,267,307
Cypress	Taxodium	21,518	421,475	6,650	145,635
Cedar	Juniperus	70	2,100	2,869	76,602
Walnut	Juglans	6	240	721	31,414
Hickory	Hicoria	2,790	65,200	7,076	194,165
Cottonwood	Populus	390	6,000	1,269	19,822
Beech	Fagus			1,125	16,808
Chestnut	Castanea	400	4,800	1,909	41,177
Oak	Quercus	50,588	886,746	86,557	1,707,770
Elm	Ulmus			1,082	19,346
Poplar	Liriodendron	35,206	627,686	38,324	814,385
Sweet gum	Liquidambar	*	*	17,092	246,125
Sycamore	Platanus	575	6,000	721	31,414
Cherry	Prunus			117	5,850
Maple	Acer			1,041	19,717
Basswood	Tilia	8	81	564	11,241
Tupelo gum	Nyssa	*13,678	*161,268	13,074	166,432
Ash	Fraxinus	2,641	61,310	3,387	84,675
All other species				862	64,810
Total		1,243,988	$13,563,815	1,691,001	$23,938,627

*The two or three kinds of "gum" were not returned separately in 1905.

One should not lay much stress on the excess of the 1909 figures over those for 1905, for the enumeration for 1909 is probably much more accurate, having been made in connection with the regular decennial census of 1910. If the truth were known the production for 1905 might have been the greater, partly because the area of woodland is steadily decreasing, and partly on account of the panic of 1907, which must have affected the lumber business perceptibly in 1909.

The increase in average value of lumber shown by the table, from a little less than $11 a thousand in 1905 to a little over $14 a thousand in 1909, is significant, however, and correlated with the decreasing supply.

Miscellaneous rough sawmill products.—Bulletin 77, mentioned above, reports the production in Alabama in 1905 of 73,979,000 pine shingles, worth $127,413, 38,114,000 cypress shingles, worth $79,688, and 28,721,000 laths, worth $35,113. According to the 13th Census, Alabama produced in 1909 245,871,000 shingles (kind of wood not specified), worth $588,475, and 50,979,000 laths, worth $5,959. These two items, laths and shingles, seem to be also included in the figures given in Table 3.

The following additional products of mills are reported in the 13th Census publication above mentioned.

Slack cooperage stock

Staves (pine)	14,977,000
Sets of heading (pine)	4,049,000
Sets of hoops (oak)	150,000

(The additional 3,899,000 sets of hoops needed were presumably iron.)

Staves for tight barrels, 12,978,000 (probably mostly white oak).

Veneers, crate material, etc. (measured in thousand feet b. m.)

Pine	1,813
Hickory	20
Cottonwood	75
Beech	70
Red oak	6
Elm	75
Poplar	1,770
Magnolia	89
Sweet gum	6,632
Sycamore	2
Maple	25
Tupelo gum	3,841
Ash	4
Total	14,422 M ft.

Timber-camp products.—These are forest products which reach the consumer without passing through a mill of any kind. The statistics for 1905 and 1909 are given in separate tables.

TABLE 4. TIMBER-CAMP PRODUCTS, 1905.

NAME	QUANTITY	VALUE
Logs for mills	1,033,078 M ft.	----------
Logs sold	73,200 M ft.	----------
Cross-ties	945,404	$242,605
Fence-posts	30,000	3,000
Telegraph (etc.) poles	1,300	705

TABLE 5. TIMBER-CAMP PRODUCTS, 1909.

NAME	QUANTITY	VALUE
Logs for domestic manufacture	30,587 M ft.	$136,930
Logs for export (mostly hardwood)	1,086 M ft.	7,345
Hewed timber	2,989 M ft.	20,336
Cross-ties	262,100	66,909
Fence-posts	87,988	3,625
Telegraph and telephone poles	1,754	2,183
Piles	1,745	1,880
Split and shaved shingles	302,000	505
Charcoal	522,000 bushels	20,495
Cooperage stock	2,100 cords	8,500
Handle stock	300 cords	600
Excelsior stock	25 cords	250
Wheel stock	25 cords	100
Tanbark (oak)	49 cords	275
Miscellaneous	----------	2,197
Total value	----------	$272,775

(The figures for cross-ties, poles and piles appear to be very incomplete, and mine-timbers are not mentioned at all.)

Naval stores.—According to Bulletin 126 of the 12th Census, published in 1902, there were in Alabama in 1900 152 turpentine stills, employing 3,643 men on the average (more than that in spring and less in winter), producing in that year 74,078 barrels of turpentine, worth $1,460,582; 245,394 barrels of rosin, worth $490,-882; and $82,241 worth of other "naval stores," such as tar and pitch. The exports of these commodities from

Mobile in the same year were 153,018 gallons of turpentine, 58,646 barrels of rosin and pitch, and 113 barrels of tar.

The following table gives some later statistics of the same industry, taken from "Forest products of the United States, 1909."

TABLE 6. THE NAVAL STORES INDUSTRY IN ALABAMA, 1904-1909.

	1904	1907	1908	1909
Turpentine stills	144	185	192	175
"Crops" worked (reckoned at 10,500 boxes or cups each):				
Boxes (old system)				1,636
Cups and gutters (Herty system and modifications)				309
Turpentine produced (gallons)	3,108,000	3,544,000	3,744,000	2,840,000
Value of same	$1,502,000			$1,254,000
Rosin (barrels of 280 lbs.)	360,000	419,000	447,000	310,000
Value of same	$930,000			$1,214,000

For the last decade or two Alabama has ranked third in the production of naval stores, being far surpassed by Georgia and Florida. At earlier periods it was surpassed also by the Carolinas, but the industry has declined greatly in those states, owing to the exhaustion of the timber. The only other states producing naval stores are Mississippi, Louisiana and Texas, and the industry is still in its infancy in the last-named. From 1904 to 1909 Alabama produced just about 10% of all the turpentine and rosin made in the United States.

According to page 169 of the publication last cited, there were distilled in Alabama in 1909 46,478 cords of softwood, costing $69,859. This was probably nearly all long-leaf pine (stumps, knots, etc.), converted by distillation into charcoal, turpentine, etc. In this comparatively new branch of the naval stores industry Alabama leads all the states, the quantity mentioned being 40.3% of the total for the United States in the year named.

Practically all of our turpentine and rosin comes from the long-leaf and slash pines, *Pinus palustris* and *P. El-*

liottii. The production seems to have passed its climax in Alabama, owing largely to the recent rapid destruction of the long-leaf pine forests by farmers, as explained in the foregoing pages, but at the same time it is extending farther inland, into regions where the long-leaf pine is so scattered that its exploitation would not have been profitable a few years ago. Up to the close of the last century turpentine stills in Alabama were chiefly confined to those regions where long-leaf pine constituted more than 25% of the original forests; namely 6b, 12, 13, and parts of no. 10. But they are now in operation as far inland as Tuscaloosa, Chilton, Coosa and Randolph Counties.*

Conclusion.—In descriptions of the forest resources of a state or nation it has long been customary to estimate the amount of standing timber, the rate of consumption, and the normal annual growth, and from these data to predict how long the forests will last. The information at hand is not sufficiently trustworthy to allow us to make such predictions for Alabama with any degree of accuracy, and even if it was, it would hardly be worth while to do so, on account of changes in economic conditions which are continually taking place and upsetting calculations.

No doubt our forests are being cut at the present time somewhat faster than they are growing; and yet the time set for their exhaustion is continually receding into the future. On page 120 it was pointed out that the end of our great long-leaf pine forests, predicted as imminent a generation ago, is not yet in sight. Mr. Hu Maxwell, in his recent article on the timber resources of the South (referred to in a footnote on page 30), which is

*On Feb. 4, 1913, I saw a few barrels of rosin at the L. & N. depot in Talladega, but did not learn where they originated.

For additional information about this industry the reader is referred to the following:—Tenth Census U. S. 9:516-518, 529-530, 1884; L. W. Robarts, Pop. Sci. Monthly 30:829-831, April 1887; L. J. Vance, same 48:469-480, Feb. 1896; Mohr 5 or 6 (pp. 67-72); and a much more recent paper by Dr. C. H. Herty (the inventor of the cup-and-gutter system) on "The past, present and future of the naval stores industry," published in the proceedings of the Eighth International Congress of Applied Chemistry, vol. 12, 1912, and in the Journal of the Elisha Mitchell Scientific Society for December, 1912 (vol. 28, pp. 117-130).

one of the sanest reviews of the existing timber situation ever published, cites several similar instances for other parts of the country and for much earlier periods. As far back as 1749, and again in 1795, he says, alarm was felt in some of the northern states over the diminishing supply of timber, and tree-planting was advocated as a remedy. Another instance of the same kind came to my notice a few years ago. A writer in the American Journal of Science about 1830, which was before there were any railroads, expressed the fear that the forests would soon be used up for steamboat fuel!

The principal factor which has prevented the realization of these early predictions of a timber famine has been the discovery and exploitation of vast forests which were unknown or at least inaccessible (on account of the absence of railroads) in those days. (The opening up of innumerable coal mines might be regarded as having operated to diminish the drain on the forests for fuel, but it is doubtful if it has kept pace with the increase of population and manufactures. If there had never been any coal mines on this continent the United States would be still almost entirely an agricultural nation, and the population would be much less than it is.)

We have perhaps nearly reached the end of the possibility of relief through the discovery of new supplies of timber, for the extent of the forests of the United States is now pretty well known, and nearly every standing tree has been seen by one or more lumbermen. Some timber of course can and will be imported from more thinly settled countries, such as Canada and South America, but the farther it has to be transported the more it costs the consumer. The preservation of our forests in the future will have to depend chiefly on the operation of the well-known economic law of supply and demand. As wood becomes scarcer and less accessible its price will rise and less of it will be used per capita.

By far the greatest demands on the forests at present are for fuel and building-material. No statistics of the amount of wood consumed for fuel seem to be available, but the rate is not likely to decrease much very soon, because people living at a distance from railroads and coal mines cannot very well use coal. The use of wood for

building-material will diminish from two or three independent causes, both or all of which have long been in operation in Europe. In the first place, as the country fills up the rate of increase of population will diminish, more precautions will be taken against fire, and fewer new houses will be built. Second—and much more important—brick, stone, concrete, and other lasting materials can and will be substituted for wood at an ever-increasing rate.

Not only in the building trades but in various lines of manufacture is the substitution of other materials for wood proceeding rapidly. It has been very noticeable in the last decade or two in the case of such familiar articles as fences, dams, bridges, mile-posts, signs, tanks, railroad cars, bedsteads, barrels, buckets, umbrella rods, packing boxes (many of which are now made of corrugated pasteboard), and others too numerous to mention.

Among the commoner forest products of the South cross-ties probably come next in quantity to fuel and building material. Estimating the length of the railroads in this state at 5,000 miles, the number of ties at 3,000 to the mile, their volume at 40 feet b. m. each, and their average life at five years, the railroads of Alabama alone would consume about 3,000,000 ties a year, equivalent to about 120,000,000 feet of timber, which is about one-twelfth as much as the combined output of all the sawmills in the state. The only present hope for diminishing this drain upon the forests seems to lie in treating the ties with preservatives to make them last longer; for metal and concrete cross-ties have not yet passed the experimental stage in America.

But taking all things into consideration there does not seem to be much need to worry about the timber supply, for as it diminishes we will gradually adjust ourselves to changing conditions. (Even if we cannot get along with as little wood as do the Eskimos, Tibetans, Chinese and Arabs, we might in time learn to use it as sparingly as the Spaniards and Mexicans do.) But it is to our advantage to make these conditions change as slowly as possible, and care of the existing forests and economy in the use of the products derived from them is still a good policy, as it always has been.

INDEX

This index aims to include all names of trees—both technical and common names—names of persons, geographical names, and all other topics not sufficiently indicated by the table of contents, which an interested reader would be likely to look for. (The illustrations are indexed too, having been put on numbered pages for that purpose, instead of on plates as is often done.)

Botanical names are printed in italics. For the benefit of persons who may know some of the trees better by different technical names which were current a generation ago, a few synonyms, not mentioned in the preceding pages, are included in the index, with cross-references. Figures in parentheses indicate pages where the topic referred to is mentioned indirectly or under a different name.

A

Acer (not specified) 198, 200
" *Floridanum* 61, 75, 88, 101, 110, 191
" *leucoderme* 50, 56, 61, 69, 106, 191
" *Negundo* 44, 56, 61, 69, 76, 88, 93, 101, 106, (156), 191
" *rubrum* 39, 44, 50, 56, 61, 66, 69, 76, 80, 83, 88, 93, 96, 101, 106, 110, 117, 125, 191
" *saccharinum* 44, 61, 69, 76, 83, 88, 93, 101, 106, 191
" *Saccharum* 44, 56, 61, 191
Acknowledgments 15
Aesculus octandra 44, 191
" *Pavia* 191
Air, density of 17, 18
Agricultural implements 199
Agriculture 30, 35, 53, 62, 89, 11, 205 (see also Farmers)
Alabama River 11, 82, 85, 115, 123
Alfalfa 90
Alkali in Lime Hills 104
Alluvial soils 35, 58, 67, 123
" swamps 74, 82, 124
Alpine Mt. (Talladega Co.) 142
Altitude, effects of 18, 20
Amelanchier 44, 50, 56, 69, 75, 87, 190
American Historical Association 9
" Journal of Science 11, 12, 205
Animals 18, 186, 187
Apalachicola River 123
Appalachian valley 58
Arabs 206
Aralia spinosa 106, 110, 117
Arctic regions 18
Arid regions 18
Arkansas 84
Artesian wells 86, 104
Ash 34, 44, 46, 56, 61, 62, 70, 71, 76, 77, 84, 88, 91, 96, 101, 103, 106, 107, 125, 126, 198, 200, 201
Asimina triloba 56, 61, 75, 190
Astonishment of natives 70
Athens, scenes near, 130
Athletic goods 199
A. B. & A. R. R. 144
Attalla, charcoal plant near, 63
Auburn 10
Autauga County 78, 79
" Creek 81
Avant, J. A. 15
Axe-handles 31, 199 (see Handles)

B

"Back to the farm" 89
Bacteria 17, 186
Bald Knob (Elmore Co.) 11
Baldwin County 113, 115, 119, 120, 126, 128, 166-169, 172, 176, 189
Ball, T. H., book by, 10, 97, 103

Bangor limestone 40, 41, 132
Bank fixtures 199
Barbour County 99
Bark horse-collars 71
Barker, A. L., 15, 163
Barnard, F. A. P. 10
Barrels 180, 201, 206
Barrens of Tennessee valley 37-40, 130
Bartram, Wm., book by, 10, 81, 84, 113
Bashi formation 97
Basin region 52-57, 140, 188, 195
Baskets 31, 45, 63, 77, 91, 94, 102, 103, 107, 123, 199
Basswood 44, 46, 50, 56, 62, 200 (see Lin)
Batodendron arboreum 117, 191
Bay, 34, 50, 51, 55, 61, 65, 66, 69, 75, 80, 83, 87, 93, 96, 101, 106, 109, 110, 117, 125, 150, 198 (see also Red bay)
Bay Minette 114, 115, 166
Bayou la Batre 178
Bays 109, 110, 189
Bedsteads 206
Beech 39, 43, 46, 49, 50, 52, 55, 60, 62, 65, 69, 71, 74, 75, 77, 79, 82, 84, 87, 91, 93, 96, 99, 100, 103, 105, 110, 117, 134, 136, 198, 200, 201
Bell's Landing formation 97
Bermuda (Conecuh Co.), climate of 104, 188
Berney, S., book by, 10, 12
Bessemer 56
Betula lenta 50, 65, 66, 189
" *nigra* 39, 43, 50, 55, 60, 69, 75, 82, 87, 93, 96, 100, 105, 110, 117, 189
Bibb County 13, 78, 79
Bibliography 9-15, 23
Big Creek (Tuscaloosa Co.) 150
Big springs 42, 53, 59, 85, 98-99, 104, 108
Birch 39, 43, 46, 50, 55, 60, 65, 66, 69, 75, 82, 87, 93, 96, 100, 105, 110, 117
Birmingham 10, 56, 61, 62
Black belt 24, 26, 36, 84-92, 118, 154-157, 188, 190, 195
Black Bluff formation 95
Black cypress 33 (see Cypress)
" gum 34, 39, 44, 50, 56, 61, 66, 70, 76, 77, 80, 83, 88, 93, 96, 101, 106, 109, 110, 117, 125, 142, 150, 172, 198
Black haw 44, 50, 56, 61, 70, 76, 88, 106
" locust 44, (46), 50, 66, 69
" oak 50, 55, 60, 65, 69, 75, 80, 82, 100
" pine 74, 79, 109, 116
" walnut 43, 55, 60, 74, 105 (see *Juglans*, and Walnut)
Black-jack oak 39, 43, 50, 55, 60, 65, 69, 75, 80, 82, 87, 93, 96, 101, 105, 110, 117, 144
Blinds 62, 71, 77, 91, 102, 122, 199
Blount County 12, 37, 42, 138
Blue Marl region 91-94
Blue Pond (Covington Co.) 164 144
Blue Ridge 11, 13, 58, 64-67, 76, 144
Blue Spring (Barbour Co.) 99
Bluffs 41, 43, 49, 53-55, 61, 69, 70, 74-76, 86, 92, 93, 99, 100, 105, 106, 110, 115-117, 140, 189-191
Boats 46, 199
Bodka Creek (Sumter Co.) 156
Bogue Loosa Creek (Choctaw Co.) 158
Boll-weevil 90
Bon Secour Bay (Baldwin Co.) 119
Botanists 33, 189, 198
Box elder 61, 156 (see *Acer Negundo*)
Boxes 199, 206
Bridgeport, industries at, 47
Bridges 206
Brooklyn, N. Y. 118
Brookwood, long-leaf pine near, 78, 180
Brown's Valley 37, 40-42, 58
Brumby, R. T., writings of, 10
Buckets 206
Buckeye 44
Buggies 31
Buhrstone formation 97, 98, 104, 158
Bullock County 91
Bumelia lanuginosa 88, 101, 110, 191
" *lycioides* 44, 56, 61, 76, 88, 101, 110, 191
Butler County 98, 99, 102, 103, 111
Butter-trays 46

C

Cabinets 198
Cahaba coal field 52, 53

Cahaba valley 58
Calcareous and non-calcareous soils 38, 41, 60, 61, 86-88, 93, 104-106, 110, 113, 190, 191
Calcium (see Lime)
Caldwell, G. W. 10, 107
Calhoun County 13, 64
Canada, forests of, 30, 205
Canals for logging 121
Cane-brake region 84
Capacity of sawmills (see Sawmills)
Carboniferous strata 38, 40, 47, 58, 64
Carpinus 39, 43, 50, 55, 60, 69, 74, 79, 82, 87, 93, 96, 100, 105, 110, 117, 189
Cars (railroad) 63, 199, 206
Castanea dentata 43, 50, 55, 60, 65, 69, 75, 79, 82, 100, 190, 198, 200
" *pumila* 50, 65, 75, 82, 100, 190
Catalpa 61, 70, 76, 83, 88, 93, 101, 106, 110, 191
Catoma Creek (Montgomery Co.) 88
Cattle 30, 31, 90, 128 (see also under regional descriptions)
Cattle-ticks (see Ticks)
Caves 42, 59, 85, 104, 108
Cedar 7, 39, 43-46, 49, 55, 60, 63, 65, 68, 82, 87, 91, 93, 99, 100, 102, 105, 107, 110, 112, 127, 128, 132, 144, 154, 180, 198, 200
Cedar Mountain (Clay Co.) 144
Ceiling 199
Celtis 44, 55, 61, 75, 82, 87, 96, 106, 156, 190, 198
Cement 90
Census figures or reports (see United States)
Central pine belt, 21, 72-84, 150-153, 195, 196
Cercis 44, 50, 56, 61, 69, 75, 88, 93, 101, 106, 110, 191
Chairs, chair stock 63, 77, 123, 125, 199
Chalk bluffs 86, 88
Chamaecyparis 116, 118, 189
Chambers County 67, 68, 70
Chandler Mountain 47, 138
Chapman, sawmill at 103
Charcoal 46, 51, 52, 57, 63, 66, 71, 77, 180, 202, 203
Cheaha Mountain 64
Chemical analyses of rocks and soils 54, 85
Cherry, wild, 44, 46, 56, 69, 75, 110, 200
Chert hills or ridges 37, 41, 43, 59, 60, 142, 189
Cherty soils 41, 58, 73
Chestnut 43, 46, 50, 52, 55, 60, 62, 65, 69, 71, 75, 77, 79, 82, 100, 198, 200
Chestnut Creek (Chilton Co.) 146
Chestnut oak 43, 50, 52, 55, 60, 65, 66, 69, 75, 79, 132, 144, 150, 198.
Chestnuts 52, 71
Childersburg, charcoal ovens at, 63, 180
Chilton County 58, 79, 146, 148, 204
Chimney rock 104, 114, 158, (162) 178
Chinese 206
Chinquapin 50, 65, 75, 82, 100
Chittamwood 44
Choctaw County 98, 99, 104, 107, 158, 160
Choctawhatchee River 115
Chunnennuggee Ridge 91, 97, 188, 195
Cigar-boxes 125, 199
Cisterns 86
Citronelle, climate of 116, 188
Cladrastis 56, 191
Claiborne formation 97, 104
Clarke County 10, 98, 99, 104, 114, 162
Clay, clayey soils 24, 41, 53, 58, 67, 72, 73, 78, 81, 85, 95, 108, 110, 113, 116
Clay County 11, 64, 65, 70, 144
Clayton, Clayton formation 97
Cleared land, clearings, extent of, 26, 28, 29, (195) (see also under regional descriptions)
Cliff pine 49, 54, 55, 140 (see *Pinus Virginiana*)
Cliffs 53, 65, 138, 189
Cliftonia 110, (111), 117, 128, 176, 191
Climate 17, 23, 187, 188
Climatic factors 19
Coal Measures 12, 47, 48, 53, 54, 78, 132, 136
" mining 51, 56, 57, 205
" region 13, 21, 37, 42, 47-59, 136-141, 188, 195

Coast strip 126-128, 174-177
Coastal plain 11, 14, 35, 36, 41, 42, 48, 54, 67, 72-128, 189-191
Coden, scene near, 174
Coffey, G. N., on soils 20
Colbert County 37, 41, 42
Columns 46, 71, 77, 199
Common names of trees 28, 189, 198, 200
Competition between plants 18
Conecuh County 10, 103, 104
" River 115
Conifers 51
Conservationists 29
Cooperage stock 32, 45, 57, 63, 77, 91, 199, 201, 202
Coosa coal field 13, 52, 53
" County 13, 70, 148, 204
" River 58, 59, 61, 67, 69, 71, 148
" valley region 12, 13, 39, 40, 42, 56, 58-64, 142-145, 188, 195.
Cordova, climate of, 54, 188
Cornus florida 44, 50, 56, 61, 66, 69, 76, 80, 83, 93, 101, 106, 110, 117, (146, 152), 191, 198
Cotinus 44, 191
Cotton 89
" baskets 31, 91, 94, 103
" boll weevil 90
" gins 31
" production 13, 89
Cottonwood 43, 60, 62, 74, 82, 87, 91, 93, 100, 105, 125, 126, 198, 200, 201
County-seats on edges of black belt 88
Covington County 109, 112, 121, 164, 170, 182
Crab-apple 50, 61
Crataegus (not specified) 191, 198
" *aestivalis* (109), 110, (111), 117, 190.
" *Crus-galli* 88, 190
" *Michauxii* 101, 190
" *spathulata* 56, 61, 69, 75, 88, 101, 190
" *viridis* 44, 61, 69, 75, 88, 96, 117, 190
Crates 32, 45, 63, 102, 107, 122, 199, 201
Crawfish 114
Crenshaw County 98
Cretaceous formations 14, 35, 72, 81, 84, 92
Cribbs's Creek (Tuscaloosa Co.) 150
Cross-ties 40, 45, 47, 51, 52, 57, 63, 66, 70, 77, 91, 94, 97, 102, 112, 122, 123, 197, 202, 206
Crystalline rocks 67
Cuba, Cuban pine 102
Cucumber tree 34, 46, 50, 55, 61, 65, 69, 75, 80, 99, 101, 106, 110, 136
Cumberland Plateau 47
Cypress 33, 43, 68, 71, 74, 77, 82, 84, 87, 91, 99, 100, 102, 103, 105, 107, 109, 111, 112, 116, 121, 122, 125, 126, 150, 164, 198, 200, 201
black 33
pond 33, 109, 11, 116, 164
red 33
river (43), 109, 116
white 33
Cyrilla 75, 80, 83, 93, 106, 110, 117, 128, 176, 191

D

Dadeville, scene near, 148
Dallas County 11, 15, 85, 87
Dams 148, 206
Daphne, climate of, 116, 188
Decatur 42, 46, 47, 134, 188
DeKalb County 11, 136, 138
Delta of Mobile River 123
Deserts 187
DeSoto Falls 136, 138
Dictionaries 83
Diospyros 44, 56, 61, 66, 70, 76, 80, 83, 88, 93, 96, 101, 106, 110, 117, 191, 198
Dissemination of seeds 18, (186)
Distillation of pine wood 122, 203
Dixie P. O., scene near, 164
Dog River (Mobile Co.) 119
Dogwood 44, 50, 56, 61, 66, 69, 76, 80, 83, 88, 93, 101, 102, 106, 110, 117, 146, 152, 198
Doors 62, 71, 77, 91, 102, 122, 199
Dothan 111
Dressed lumber 196
Duncanville, escarpment near, 78
Dunes 126-128, 176, 189

E

Earle, F. S., work of, 10, 67
Economic aspects of forests 29-34
Editorial interference 13, 83

Elm 34, 39, 43, 44, 46, 55, 61, 62, 69, 75, 77, 82, 87, 93, 96, 101, 106, 125, 132, 198, 200, 201
slippery 44, 55, 61, 87
Elmore County 11, 69, 82
Emelle (Sumter Co.), scene near, 154
Enemies of trees, 18, 25
Environmental factors 17, 185-187
Eocene formations 95, 97, 104
Epes, scene near, 154
Erosion 53, 74, 114, 115
Errata 7
Escarpments 41, 78, 81, 91, 97
Eskimos 206
Estuarine swamps (123-126), 172
Etowah County 59
Eufaula, climate of, 92, 188
Europe, 194, 206
Eutaw 81, 88
" belt 81-84, 188, 195
" formation 81
Evaporation 19, 49
Evergreen, industries of, 107
Evergreen oak 160 (see *Quercus laurifolia*)
Evergreens for decorative purposes 94, 103, 107
Evergreens, proportion of in forests, 15, 28, 109, 148, 154, 187, 191 (see also under regional descriptions)
Exaggerated claims (33, 46), 52, 77
Excelsior 122, 197, 199, 202
Experiments (ecological) 18

F

Fagus 39, 43, 50, 55, 60, 65, 69, 75, 79, 82, 87, 93, 96, 100, 105, 110, 117, 134, 136, 190, 198, 200.
Falkville, sawmill at, 46
Fall-line 35, 67, 68, 78
Farmers 29, 31, 32, 51, 56, 66, 70, 89, 108, 111, 113, 120, 170, 204
Fences, fence-posts and rails 31, 128, 202, 206
Ferruginous concretions 73
" sandstone 73, 78, 114, 152
Fertilization, fertilizers 48, 89, 108
Fippin, E. O., on soils 20
Fire, effects of, 17, 25-27, 30, 79, 83, 144, 186, 187, 206 (see also under regional descriptions)
Fish River (Baldwin Co.) 119
Fishermen 128
Flatwoods 39, 60, 61, 130, 142
Flint Creek (Morgan Co.) 134
Flomaton, climate of, 116, 188
Flooring 62, 122, 199
Florala 111
Florence 38, 42, 47, 188
Florida 10, 30, 83, 103, 108, 109, 113, 115, 116, 118, 126, 128, 176, 203
Fluctuation of water 28, 42, 48, 53, 59, 68, 99, 115, 124, 186
Foot-hills 67
Foreign trade 118, (123, 202-203, 205)
Forest products 31-34 (see also under regional descriptions)
" types 17, 19, 20, 25 (see also under regional descriptions)
Fort Deposit 88, 92, 188
Fort Mitchell 10
Fort Payne 138
Foster, J. H. 11
Franklin, J. 15
Franklin County 73
Frankville, turpentine still near, 178
Fraxinus Americana 44, 56, 61, 70, 76, 88, 96, 101, 106, 191, 198
" *Caroliniana* 76, 101, 191
" *quadrangulata* 56, 191
" *sp.* 125, 200
Freight cars 63
Frost 19, 24, 49
Frye, A. E., geography by, 22
Fuel 31, 52, 112, 122, 148, 197, 205, 206
Fungi 17, 186
Furniture 31, 32, 46, 52, 63, 71, 122, 199

G

Gadsden, climate of, 59, 188
Game laws 31
Gannett, H., writings of, 24
Geiger, scene near, 156
Geographical classification 17
Geology 14, 18, 21, 35, 186, 187, 196

Geomorphologists 48
Geomys Tuza 115
Georgia 10, 11, 47, 72, 78, 81, 89-91, 97, 102, 108, 113, 115, 118, 203
Gibson, A. M. 12
Gins 31
Gleditschia 44, 75, 191
Gneiss 67, 146
Goodwater, climate of, 68, 188
Gordonia 117, 118, 191
Gorges 38, 39, 48, 138
Gosse, P. H., book by, 11, 84
Grand Bay, scenes near, 170
Granite 67
Grape vines 156
Grass 26
Grasselli, scene near, 144
Gravitation, effects of, 18
Grazing 26, 30
Great Lakes 38
Greene County 81
Greensboro 88
Ground-water 14, 19, 20, 28-29, 38, 42, 59, 86, 99, 116
Grove Hill 10
Growing season, length of, 19, 24, 188 (see also under regional descriptions)
Gulf of Mexico 123, 124, 126
Gum (not specified) 200
black (see *Nyssa biflora*, *N. sylvatica*)
red 34, 46, 198 (see next)
sweet (see *Liquidambar*)
tupelo (see *Nyssa uniflora*)
Guntersville 41

H

Hackberry 44, 46, 55, 61, 75, 82, 87, 91, 96, 106, 156, 198
Hale, C. S., paper by, 11, 84
Hale County 13, 78, 152
Halesia Carolina 44, 50, 70, 191
" *diptera* 70, 88, 101, 106, 110, 117, 191
Hamamelis 160
Hamilton, climate of, 188
Hammock defined 83
Hammock vegetation, hammocks 19-20, 83, 92, 99-101, 105, 109, 110, 116, 117, 127, 189-191
Handles 31, 32, 46, 52, 63, 71, 91, 102, 199, 202
Harbison, T. G., paper by, 11, 47
Hardwoods 19, 45, 60, 86, 103, 112, 123, 148, 154-157, 180, 197, 202
Harris, J. T., work of, 11, 32-34, 45, 62, 197
Hartford, 111
Hartselle, scene near, 134
" sandstone 40, 41, 43, 132
Hatchetigbee anticline 104
" formation 97
Haw, black, 44, 50, 56, 61, 70, 76, 88, 106
May, 109-111, 117
(red) 44, 56, 61, 69, 75, 88, 96, 101, 117, 198
Heading 201
Heat, effects of, 17
Hemlock 49, 136
Henry County 103
Herty, C. H. 63, 122, 178, 203, 204.
Hickory 26, 34, 39, 40, 43, 46, 49, 52, 55, 60, 62, 65, 68, 70, 71, 74, 77, 79, 82, 84, 87, 91, 94, 96, 100, 103, 105, 107, 110, 116, 198-201
bitternut 43
pignut 49, 55, 60, 65, 68, 74, 79, 100, 116, 127
scaly-bark 39, 43, 49, 74, 87, 96, 132
swamp (74), 100, 105, 116 116
Hickory nuts 46, 52, 71, 103
Hicoria (not specified) 198, 200
" *alba* 39, 43, 49, 55, 60, 65, 68, 74, 79, 82, 87, 96, 100, 105, 110, 116, 189
" *aquatica* 74, 82, 87, 100, 105, 116, 189
" *glabra* 43, 49, 55, 60, 65, 68, 74, 79, 100, 116, 127, 189
" *microcarpa* 60, 189
" *minima* 43
" *ovata* 39, 43, 49, 60, 74, 87, 96, 132, 189
Highland Rim 37
Hill country of Alabama 35-71
Hodges, R. S., analysis by, (54)
" " " photographs by, 136, 164, 166, 168, 174, 178, 182
Hog plum 44
Hogs 30, 31
Hollins, scene near, 144

Holly 44, 50, 51, 56, 61, 66, 69, 75, 80, 83, 88, 93, 96, 101, 106, 107, 110, 117
Honey 71, 77, 103, 128
Honey locust 44, 75
Hoops 201
Horse-collars 71
Houston County 103
Hubs 46
Humid regions 18
Humidity 18
Humus 26, 43, 83, 186
Huntsville 42, 47
Hurricane sta. 172

I

Ilex decidua 56, 75, 191
" *myrtifolia* (109), 110, (111), 117, 191
" *opaca* 44, 50, 56, 61, 66, 69, 75, 80, 83, 93, 96, 101, 106, (107), 110, 117, 164, 191
" *vomitoria* 110, 117, 191
Illinois 89
Illustrations 129-183
note on, 34
Insects 17, 25
Interior finish 62, 199
Iowa 89
Iron furnaces 51, 57, 63
" ore 53
Ironwood 39, 43, 50, 55, 60, 69, 74, 79, 82, 87, 93, 100, 105, 110, 117
Islands 126, 128

J

Jack-pine plains of Michigan 127
Jackson 107, 162, 194, 195
" County 41, 46, 51, 132, 180
" Lumber Co. 182
Jasper, scene near, 140
Jefferson County 54, 56, 61, 142, 144, 189, 194, 195
John, S. W., 15
Johnson, L. C., writings of, 14, 113, 119
Johnson grass 89
Jones's Valley 13, 58, 142, 144
Juglans nigra 43, 55, 60, 74, 189, 200
Juniper 116, 118, 121, 122
Juniperus 7, 39, 43, 49, 55, 60, 65, 68, 82, 87, 93, 100, 105, 110, 127, 132, 144, 154, 189, 198, 200. (Several additional references under Cedar)

K

Kaul Lumber Co. 80
Kentucky 47
Keokuk chert 38
Killebrew, J. B. 29
Kitchen cabinets 198

L

Lafayette formation (35), 73, 78, 85-88, 92, 95, 98, 104, 114
Langdon, D. W., Jr. 14
Laths 62, 122, 197, 199-201
Latitude, influence of, 18, 186, 187
Lauderdale chert 38, 40
" County 37, 38, 40-42
Lawrence County 37, 41, 42
Lee County 11, 70
Leguminous plants, absence of, 127
Light, effects of, 17-19
Lightning 25
Lightwood 103
Lime, limestone 36, 37, 39, 41-43, 48, 53, 54, 58, 60, 61, 67, 73, 78, 84, 85, 88, 95, 98, 100, 104-106, 108-110, 114, 115, 162, 178, 189, 191
Lime hills 103-107, 111, 162, 178, 188, 195
Lime-sink region 108-113, 115, 116, 118, 164, 195
Lime-sinks 85, 108, 164
Limestone County 11, 37, 38, 41, 130, 134
Limonite 78
Lin 44, 46, 50, 56, 61, 62, 66, 69, 76, 83, 88, 93, 101, 106, 132, (200)
Liriodendron 39, 44, 50, 55, 61, 65, 69, 75, 80, 83, 87, 93, 96, 101, 106, 110, 117, 190, 198, 200 (see also Poplar)
Liquidambar 39, 44, 50, 56, 61, 66, 69, 75, 80, 83, 87, 93, 96, 101, 106, 110, 117, 125, 127, 134, 142, 190, 198, 200 (see also Sweet gum)
Lisman, scene near, 160
Little Mountains of Tennessee valley 37, 41, 43
Little River (Lookout Mt.) 136, 138
Live oak 110, 111, 127, 128, 174, 176
Livingston 88

Loblolly pine 198 (see *Pinus Taeda*)
Lockhart 113, 121, 170, 182, 194, 195
Locks in navigable rivers 57, 59, 90, 148
Locomotives, wood-burning, 112, (122), 183
Locust, black 44, (46), 50, 66, 69
honey 44, 75
Locust pins 46
Log-carts 121
Log-trains 182
Logs 81, 103, 121, 182, 197, 202.
Long-leaf pine 19, 26, 27, 33, 45, 46, 49, 52, 54, 55, 57, 59, 60, 62, 63, 65, 66, 68, 70, 71, 74, 74, 77, 79, 80, 82, 84, 87, 91, 93, 94, 96, 97, 99, 100, 102, 103, 105, 107, 109, 111-113, 116, (118, 119), 120-122, 126, 140, 142, 144, 146, 148, 152, 160, (164), 166-171, 178, 182, 198, 203, 204
Long-leaf pine hills 78-81, 113-115, 152, 195
Lookout Mountain 11, 47, 136, 138
Louisiana 113, 203
Lowndes County 85, 87, 91
Lumber 32, 40, 52, 57, 62, 66, 70, 77, 80, 94, 97, 102, 103, 107, 112, 122, 123, 166, 194, 196, 197, 199
Lumbermen 29, 30, 33, 51, 113, 205
Lyell, Sir Charles, 11, 25, 81, 84, 97, 103

M

Macon County, evergreens in, 88
Madison, climate of, 38, 42, 188
" County 37, 41, 46, 132, 191
Magnesia 95
Magnetism, terrestrial, 18
Magnolia 83, 87, 93, 96, 101, 103, 105-107, 110, 117, 127, 198, 201
Magnolia (not specified) 34, 45
" *acuminata* 55, 75, 101, 106, 190
" *glauca* 50, 55, 61, 65, 69, 75, 80, 83, 87, 93, 96, 101, 106, 110, 117, 125, 150, 190, 198
Magnolia grandiflora 83, 87, 93, 96, 101, (103, 105), 106, (107), 110, 117, 127, 190, 198, (201)
" *macrophylla* 50, 55, 61, 65, 69, 75, 80, 101, 106, 136, 190
" *pyramidata* 75, 101, 110, 190
" *tripetala* 50, 69, 75, 80, 190
Maine, forests of, 30
Malaria 15, 90, (106)
Mallet, J. W., work of, 14
Malus angustifolia 50, 61, 190
Manchester, sawmill at, 57
Mantels 102
Manufacturing 51, 62, 89
Maple (not specified) 34, 46, 50, 62, 66, 198, 200
red 39, 44, 50, 56, 61, 66, 69, 76, 80, 83, 88, 93, 96, 101, 106, 110, 117, 125
silver 44, 61, 76, 88, 93, 101, 106
sugar 44, 50, 56, 61, 69, 75, 88, 101, 106, 110
Marengo County 94
Marion 88
" County 48
Marshall County 51
Marshes 124, 126-128
Maryland 72
Maxwell, H. 11, 30, 32-34, 45, 62, 197, 204
May haw 109-111, 117
McCalla, scene near, 142
McCalley, H. 12, 13, 37, 38, 47, 48, 53, 54, 58, 72
McGuire, W. W., paper by, 12, 84
Medicine 46, 63
Metamorphic region 11
" rocks 64, 67
Mexicans 206. Mexico 35
Michigan 120, 127
Midway formation 97-99
Mile-posts 206
Millry, scene near, 178
Mine props or timbers 51, 52, 57, 63
Mineral region 35-71
Minerals 35
Miners 56
Mining 51, 57, 62
Minnesota, forests of, 30
Mississippi 24, 36, 72, 81, 84, 90, 91, 95, 98, 103, 118, 126, 203

Missouri 89
Mobile 10, 14, 116, 118, 123-125, 188, 194-196, 203
" Bay 115, 119, 123, 126
" County 14, 113, 118, 120, 125, 126, 170, 174, 178
" delta 123-126, 172, 189
" River 124
M. & O. R. R. 78, 79
Mock orange 56 (see *Prunus Caroliniana*)
Mohr, Charles, 10, 12, 13, 22, 25, 37, 38, 47, 48, 53, 54, 58, 64, 72, 84, 85, 97, 113, 119, 120, 123, 126, 136, 204
Mohrodendron (see *Halesia*)
Moisture, effects of, 17, 19
Moles 186
Monroe County 98
Montgomery 10, 14, 82, 84, 88, 188
" Advertiser 90
" County 91
Moon, influence on vegetation 18
Morgan County 37, 41, 134
Morus rubra 44, 55, 61, 69, 75, 83, 87, 93, 101, 106, 110, 190
Moss 105
Mouldings 62, 102
Mountain limestone 40
" oak 65 (see *Quercus Prinus*)
Mountains of North Ala. 18, 35, 44, 64, 132, 189
" (so-called) in coastal plain 36, 78, 81, 98, 99, 102, 158
Mud 85, 114, 115
Mulberry 44, 55, 61, 69, 75, 83, 87, 93, 101, 105, 106, 110
Murphree's Valley 58
Mussel Shoals 42
Myrica cerifera 93, 110, 117, 128
Myrtle 93, 110, 117, 128

N

Naheola formation 97
Names of trees 28, 189, 207
Nanafalia formation 97, 99
National Magazine 182
Natural bridges 42, 53, 136
Naval stores 57, 63, 70, 71, 80, 102, 112, 121, 123, 202-204 (see also Turpentine)
Navigable streams 42, 59, 68, 84, 91, 102
Negro population 89, 111, 178
Negundo 156 (see *Acer Negundo*)
New Decatur, scene near, 134
New Hampshire 118
New York 35
Newspapers 31, 47, (90)
Nitrogen in soil 25, 27, 30, 36, 95
Non-alluvial swamps 75, 76, 83, 88, 93, 100, 101, 106, 116, 117, 124, 150, 189-191
North Carolina 10, 64, 78, 99, 118, 127, 203
Northport, scene near, 150
Nuts (see Chestnut, Hickory, Walnut)
Nyssa biflora 50, 56, 61, 76, 80, 83, 88, 93, 101, 106, 110, 117, 125, 150, 172, 191, 198
" *sylvatica* 39, 44, 50, 56, 61, 66, 70, 76, 80, 88, 96, 101, 106, 142, 191
" *uniflora* 44, 61, 76, 83, 88, 101, 110, 117, 125, 191, 198, 200

O

Oak (not specified) 26, 27, 33, 38, 46, 49, 54, 59, 74, 76, 80, 92, 94, 99, 102, 105, 111, 112, 118, 125, 134, 154, 158, 191, 200, 202
black 50, 55, 60, 65, 69, 75, 80, 82, 100
black-jack 39, 43, 50, 55, 60, 65, 69, 75, 80, 82, 87, 93, 96, 101, 105, 110, 117, 144
chestnut 43, 50, 52, 55, 60, 65, 66, 69, 75, 79, 132, 144, 150
live 110, 111, 117, 127, 128, 174, 176
mountain 65 (see *Quercus Prinus*)
post 33, 39, 40, 43, 50, 52, 55, 57, 60, 63, 65, 66, 69, 70, 75, 77, 79, 82, 86, 87, 91, 93, 96, 97, 100, 105, 117, 138, 158, 198
red (see *Quercus falcata*)
Spanish 39, 43, 50, 55, 60, 65, 69, 75, 82, 96, 101
swamp chestnut 33, 39, 43, 60, 69, 75, 82, 87, 93, 96, 100, 105, 117
swamp post 82, 87 (see *Quercus lyrata*)
turkey 80, 82, 93, 101, 105, 110, 117, 152

Oak, upland willow 80 (see *Quercus cinerea*)
water 34, 43, 50, 51, 55, 60, 69, 75, 80, 82, 87, 93, 96, 101, 106, 110, 117
white (see *Quercus alba*)
willow 34, 39, 43, 55, 60, 69, 75, 82, 87, 93, 96, 101, 106, 117, 198
Oakman, scene near, 140
Oligocene formations 104
Oneonta, scene near, 138
Opelika, climate of, 68, 188
Optimists 89
Orange Beach, scenes near, 176
Organic matter in soils 25, 27, 85
Osmanthus 93, 101, 106, 110, 117, 160, 191
Ostrya 39, 43, 50, 55, 60, 69, 74, 87, 100, 105, 110, 117, 189
Owen, Thos. M. 9, 13, 14
Oxydendron 44, 50, 56, 61, 66, 70, 76, 80, 83, 93, 96, 101, 106, 117, 191
Oysters 126

P

Packing boxes 206
Paleozoic strata 11, 12, 21, 35, 40, 41, (58), 68
Palmetto 128
Panola, scene near, 154
Pasturage 31, (128)
Paving blocks 122
Pawpaw 56, 61, 75
Pea River 115
Pearson, scenes near, 152
Peat (115, 116, 123)
Pebbles 73
Pencil wood, pencils, 45, 46, 63, 102, 107, 112, 128
Pennsylvania 52, 58, 64, 67
Perdido Bay 119, 176
" River 119
Perry County 78
Persea Borbonia 101, 190
" *pubescens* 65, 69, 75, 80, 87, 101, 117, 125, 190
Persimmon 44, 56, 61, 66, 70, 76, 80, 83, 88, 93, 96, 101, 103, 106, 110, 117, 198
Peters, T. M. 12
Pettus, R. E. 15
Phillips, J. H. 22
Phosphoric acid or phosphorus, in soil 36, 48, 81, 85
Picker-sticks 198
Piedmont region 13, 64, 67-71, 146-149, 188, 195
Pignut hickory 49, 55, 60, 65, 68, 74, 79, 100, 116, 127
Pike County 99, 160
Piles 122, 202
Pine (not specified) 20, 25, 27, 40, 49, 54, 63, 68, 70, 74, 76, 77, 92, 94, 99, 102, 103, 107, 111, 125, 126, 148, 191, 199-201
black 74, 79, 109, 116
cliff 49, 54, 55, 140 (see *Pinus Virginiana*)
Cuban 102
loblolly 198 (see *Pinus Taeda*)
long-leaf (see *Pinus palustris*)
short-leaf (see *Pinus echinata* and *P. Taeda*)
slash 33, 100, 102, 109, 111, 116, 121, 122, 127, 164, 166, 176, 198, 203
spruce 33, 49, 82, 83, 87, 93, 100, 105, 107, 109, 116, 136, 198
swamp 49
white 33, 46, 57, 62, 71, 77, 87, 91, 94
Pinus (not specified) 200
" *clausa* 7, 127, 128, 189
" *Cubensis* 102
" *echinata* 39, 43, 49, 55, 60, 65, 68, 74, 79, 82, 87, 93, 96, 100, 105, 109, 116, 138, 148, 150, 158, 189, 198 (see also Short-leaf pine)
" *Elliottii* 100, 102, 109, 116, 121, 127, 164, 166, 176, 189, 198, 203-204
" *glabra* 82-84, 87, 91, 93, 100, 103, 105, 109, 116, 189, 198
" *inops* (see *P. Virginiana*)
" *mitis* (see *P. echinata*)
" *palustris* 49, 55, 60, 65, 68, 74, 79, 82, 87, 93, 96, 100, 105, 109, 116, 140, (142), 144, (146), 148, 152, 166, (168, 170, 178, 182), 189, 198, 203. (Aditional references under Long-leaf pine)
" *serotina* 74, 79, 109, 116, 189

Pinus Taeda 39, 43, 46, 49, 55, 60, 65, 68, 74, 76, 79, 82, 87, 93, 96, 100, 105, 109, 116, 127, 130, 142, 160, 178, 189, 198 (see also Short-leaf pine)
" *Virginiana* 43, 46, 49, 55, 57, 60, 65, 79, 140, 144, 189
Pioneer vegetation 36
Pitch 203
Planera 44, 75, 82, 87, 93, 101, 106, 110, 190
Platanus 39, 44, 50, 56, 61, 69, 75, 83, 87, 93, 96, 101, 106, 110, 117, 156, 190, 198, 200
Plateau region 12, 37, 41, 47-54, 136-139, 189, 195
Pliocene strata 35, 108, 113
Plum, hog 44
wild 44, 56, 61, 88
"Pocosin" of Pike Co. 99, 160
Pocosins of N. C. 99, 127
Poles 45, 52, 71, 77, 112, 122, 180, 197, 202
Pond cypress 33, 109, 111, 116, 164, 166
Ponds 36, 38, 39, 67, 80, 95, 108, 109, 115-117, 121, 182, 189-191
Poplar 34, 39, 44, 46, 49, 50, 52, 55, 57, 61, 62, 65, 69, 70, 71, 75, 77, 80, 83, 84, 87, 91, 93, 94, 96, 97, 101, 103, 106, 107, 110, 113, 117, 121, 198, 200, 201
Population 29, 30, 186, 193-196 (see also under regional descriptions)
Populus (not specified) 200
" *deltoides* 43, 60, 74, 82, 87, 93, 100, 105, 189, 198 (see also Cottonwood)
" *heterophylla* 125, 189, 198
Portland cement 90
Post oak 33, 39, 40, 43, 50, 52, 55, 57, 60, 63, 65, 66, 69, 70, 75, 77, 79, 82, 86, 87, 91, 93, 96, 97, 100, 105, 117, 138, 158, 198
Post oak flatwoods 39, 94-97, 158
Posts 45, 52, 63, 91, 102, 107, 128, 180, 197, 202
Potash or potassium, in soil 25, 29, 36, 54, 73, 81, 85, 88, 95, 98, 104, 114
Pot-holes 73
Prairie region 12, 84
Prairies 86
Pratt, D. 15
Prattville, escarpment near, 81
Precipitation 18, 24, 188
Predictions of forest exhaustion 119, 204
Prentice, sawmill at, 94, 194, 195
Prickly ash 106, 110, 117
Prophecies 120
Prunus Americana 44, 56, 61, 88, 190
" *Caroliniana* 55, 88, 101, 190
" *serotina* 44, 56, 69, 75, 110, 190, 200
" *umbellata* 44, 190
Pump-logs 46
Pushmataha, climate of, 99, 188
Pyriton 144
Pyrus angustifolia (see *Malus*)

Q

Quantitative analyses of forests 5, 9
Quercus (not specified) 200
" *acuminata* (see *Q. Muhlenbergii*)
" *alba* 39, 43, 50, 55, 60, 65, 69, 75, 79, 82, 87, 93, 96, 100, 105, 110, 117, 132, 190, 198. (Additional references under White oak)
" *aquatica* (see *Q. nigra*)
" *brevifolia* (see *Q. cinerea*)
" *Catesbaei* 69, 75, 80, 82, 87, 93, 101, 105, 110, 117, 152, 190
" *cinerea* 55, 69, 75, 80, 82, 87, 101, 105, 110, 117, 190
" *coccinea* 39, 43, 50, 55, 60, 65, 69, 75, 82, 96, 101, 190
" *digitata* (see *Q. falcata*)
" *Durandii* 55, 87, 93, 105, 190
" *falcata* 39, 43, 50, 55, 60, 69, 75, 79, 82, 87, 93, 96, 100, 105, 110, 117, 134, 138, 190, 198 (see also Red oak)

Quercus geminata 110, 117, 128, 176, 190
" *laurifolia* 55, 60, 69, 75, 82, 87, 93, 96, 101, 106, 110, 117, 160, 190
" *lyrata* 60, 75, 82, 87, 93, 100, 117, 190
" *Margaretta* 75, 87, 100, 117, 190
" *Marylandica* 39, 43, 50, 55, 60, 65, 69, 75, 80, 82, 87, 93, 96, 101, 105, 110, 117, 144, 190
" *Michauxii* 39, 43, 55, 60, 69, 75, 82, 87, 93, 96, 100, 105, 117, 190
" *minor* (see *Q. stellata*)
" *Muhlenbergii* 43, 55, 60, 75, 105, 110, 190
" *myrtifolia* 128
" *nigra* 43, 50, 55, 60, 69, 75, 80, 82, 87, 93, 96, 101, 106, 110, 117, 190
" *pagodaefolia* 60, 75, 82, 87, 96, 100, 190
" *Phellos* 39, 43, 60, 69, 75, 82, 87, 93, 96, 101, 106, 117, 190, 198
" *Prinus* 43, 50, 55, 60, 65, 69, 75, 79, 132, 144, 150, 190
" *rubra* 43, 50, 55, 60, 69, 75, 100, 190
" *Schneckii* 43, 60, 87, 100, 105, 110, 190
" *stellata* 39, 43, 50, 55, 60, 65, 69, 75, 79, 82, 87, 93, 96, 100, 105, 117, 138, 158, 190, 190 (see also Post oak)
" *velutina* 43, 50, 55, 60, 65, 69, 75, 80, 82, 100, 190
" *virens* (see next)
" *Virginiana* 110, 127, 174, 190

R

Radioactivity 18
Railroads 26, 41, 51, 53, 57, 62, 65, 84, 85, 98, 99, 102, 112, 123, 205, 206
Rainfall 19, 20, 24, 188 (see also under regional descriptions)
Randolph County 146, 204
Ravines 38, 48, 49, 53, 54, 60, 65, 68, 69, 74, 75, 78, 80, 82, 83, 92, 93, 98-100, 105, 106, 136, 190, 191
Red bay 65, 66, 69, 75, 80, 87, 101, 117, 125
" cedar (see Cedar)
" cypress 33
" gum 34, 46, 198 (see Sweet gum)
" haw 44 (see Haw)
" hills, southern, 97-103, 158-161, 188, 195
" levels 98
" maple 39, 44, 50, 56, 61, 66, 69, 76, 80, 83, 88, 93, 96, 101, 106, 110, 117, 125
" Mountain 58, 144
" oak 33, 39, 43, 46, 47, 50, 52, 55, 57, 60, 62, 69, 71, 75, 77, 79, 82, 84, 87, 91, 93, 94, 96, 97, 100, 103, 105, 107, 110, 117, 121, 130, 134, 138, 198, 201
Redbud 44, 50, 56, 61, 69, 75, 88, 93, 101, 105, 106, 110
Reed, F. W., report by, 13, 64, 67, 78, 79
References explained 23
Rhus cotinoides 44
Ripley formation 92
River cypress 109, 116 (see *Taxodium distichum*)
Roanoke, scene near, 146
Robarts, L. W., article by, 204
Robinia Pscudacacia 44, (46), 50, 66, 69, 191
Rock-houses 48
Roots (medicinal) 63
Rosin 57, 178, 180, 202, 203
Roth, F., work of, 12
Rotten Limestone 84, 85, 90, (154)
Roup's Valley 13, 38

S

Salamanders 79, 92, 115, 186
Salix nigra 39, 43, 50, 55, 60, 69, 74, 79, 82, 87, 93, 96, 100, 105, 110, 117, 125, 189
Salt in lime hills region 104
Salt Creek (Clarke Co.) 162
Salt marshes 126, 127
Sand, sandy soils 24, 29, 35, 58, 64, 72, 73, 78, 79, 81, 85, 87, 89, 92, 95, 98, 100, 105, 108, 110, 113-118, 126, 127, 189-191

Sand-hills 78, 85
Sand Mountain 11, 12, 47, 138
Sandstone 40, 41, 48, 53, 58, 59, 64, 73, 78, 114, 132, 136, 138, 152, 189
Sash 62, 71, 77, 91, 102, 122, 199
Sassafras 44, 46, 50, 56, 61, 63, 66, 69, 75, 83, 93, 101, 106, 190
Sassafras oil 46
Savannas 114, 166, 189
Sawmills 32, 46, 52, 57, 62, 71, 77, 80, 81, 84, 91, 94, 97, 103, 107, 112, 113, 120, 121, 125, 180, 182, 193-197, 206
Saw-palmetto 128
Scaly-bark hickory 39, 49, 60, 74, 87, 96, 132
Schistose rocks 67
Schwarz, G. F., 7, 13
Scrolls 199
Scrub of Florida 127
Scrub live oak 117, 176
Seasonal distribution of rain 19, 24, 36, 99, 186, 188
" fluctuation of water (see Fluctuation)
Selma, climate of, 86, 188
" Chalk 84, 85, 154
Sequatchie Valley (Tenn.) 37, 40
Service-berry 44, 50, 56, 69, 75, 87
Shades Valley 58
Shale 48, 53, 54, 58, 67
Sheep 30
Sheffield, industries of, 47
Shelby County 13, 61
Shell mounds 126, 127
Shingles 7, 46, 62, 77, 102, 112, 122, 123, 125, 197, 199-202
Ships, ship-building 128, 199
Shoals 68, 148
Short-leaf pine 33, 38, 39, (40), 43, 46, 49, 52, 55, 57, 59, 60, 62, 65, 68, 70, 71, 74, 76, 77, 79, 80, 84, 86, 87, 91, 93, 94, 96, 97, 99, 100, 102, 103, 105, 107, 109, 113, 116, 121, 127, 130, 138, 142, 148, 150, 158, 160, 178, 180, 198
Short-leaf pine belt 11, 72-78, 81, 82, 102, 150, 188, 195
Show-cases 31
Shuttles 46, 102, 199
Signs 206
Silver maple 44, 61, 76, 83, 88, 93, 101, 106
Skidders 121
Slash pine 33, 100, 102, 109, 111, 112, 116, 121, 122, 127, 164, 166, 176, 198, 203
Slippery elm 44, 55, 87
Sloe 44
Sloughs 42, 44, 61, 76, 83, 87, 88, 101, 110
Smilax 107
Smith, Eugene A. 10, 12-15, 19, 22, 34, 37, 38, 47, 48, 53, 54, 58, 64, 67, 72, 78, 81, 83, 84, 90-92, 95, 97, 103, 104, 108, 113, 119, 123, 126, 164, 166, 168, 174, 178, 182
Smithers Mt. (Madison Co.) 132
Soil analyses, chemistry, classification, surveys, weathering, etc. 14, 17, 19-21, 24, 53, 54, 116, 185, 186 (see also under regional descriptions)
Sourwood 44, 50, 56, 61, 66, 70, 76, 80, 83, 93, 96, 101, 106, 117
South America 205
" Carolina 10, 78, 97, 115, 203
Southern Lumberman 11, 32-34, 46, 57, 62, 71, 77, 80, 91, 94, 97, 103, 107, 113, 120, 193
Southern red hills 97-103, 158-161, 188, 195
Southwestern pine hills 113-123, 166-171, 188, 189, 195
Spaniards 206
Spanish oak 39, 43, 50, 55, 60, 65, 69, 75, 82, 96, 101
Sparkleberry 117
Spokes 46, 63, 91, 102
Sporting goods 46, 199
Springs 49, 53, 59, 67, 74, 85, 98-99, 104, 108, 116
Sprnce 33, 84, 103
Spruce pine 33, 49, 82, 83, 87, 93, 100, 105, 107, 109, 116, 136, 198
St. Clair County 138
St. Louis limestone 41
St. Stephens " 104, 162
Staves, stave-bolts 40, 52, 102, 107, 158, 201
Stelle, J. P., pamphlet by, 14, 113
Stemly, scene near, 142
Stills (see Turpentine)
Stock-laws 30, 31 (see also under regional descriptions)

Stove-wood 31-32
Street brooms 46
Stubbs, W. C. 10
Students, assistance from 15, 31
Subterranean life 17, 79, (186)
" streams 42, 53, 59, 67, 85, 108
Sucarnochee formation 95
Sugar-cane 99
" maple 44, 50, 56, 61, 69, 75, 88, 101, 106, 110
Sulphur in lime hills 104
Sumter County 15, 88, 95, 154-158
Sunlight, sunshine 20, 186
Swamp chestnut oak 33, 39, 43, 55, 60, 69, 75, 82, 87, 93, 96, 100, 105, 117
" hickory (74), 100, 105, 116
" pine 49
" post oak 82, 87
Swamps 19, 36, 42, 49, 74, 76, 79, 80, 82-84, 86-88, 90, 92, 93, 98, 100-102, 105, 106, 109, 110, 115-117, 123-125, 150, 160, 172, 189-191
Sweet gum 34, 39, 44, 46, 49, 50, 52, 56, 61, 62, 66, 69, 71, 74, 75, 77, 80, 83, 84, 87, 91, 93, 94, 96, 97, 101, 103, 106, 107, 110, 117, 121, 125-127, 134, 142, 198, 200, 201
Sweet-leaf 50, 51, 70, 76, 101, 106, 117
Sycamore 39, 44, 46, 50, 56, 61, 62, 69, 75, 83, 87, 91, 93, 96, 101, 106, 110, 117, 156, 198, 200, 201
Symplocos 50, 70, 76, 101, 106, 117, 191

T

Talladega 58, 188, 204
" County 13, 61-64, 142, 180
" Creek 65
Tallapoosa County 148
" River 82, 148
Tanbark, tanning extract 52, 66, 202
Tanks 79, 206
Taxodium (not specified) 200
" *distichum* 43, 68, 74, 82, 87, 100, 105, 109, 116, 125, 150, 189, 198 (Additional references under Cypress)
Taxodium imbricarium 109, 111, 116, 164, 166, 189, 198
Technical names 28, 189, 207
Telegraph and telephone poles (see Poles)
Temperate regions 18
Temperature 18-20, 186, 188 (see also under regional descriptions)
Tennessee 29, 37, 47, 84, 89, 91, 97
" River 12, 37, 38, 40, 42, 51, 59, 134, 191
" valley 12, 13, 25, 37-47, 50, 52, 58, 59, 62, 74, 128, 132-135, 188, 191, 195
Tensaw River 124, 172
Terraces 73, 109
Tertiary formations 14, 35 (see also Eocene, Oligocene, Pliocene)
Texas 84, 203
Thomasville, climate of, 99, 188
Thornton, E. Q. 14, 84, 97, 104
Tiletans 206
Ticks 31, 90
Tide 124
Tietie, tighteye (see Tyty)
Tilia 44, 50, 56, 61, 66, 69, 76, 83, 88, 93, 101, 106, 132, 191, 200
Tillandsia 105
Timber-camp products 201, 202
Titi (see Tyty)
Tombigbee River 11, 82, 90, 102, 115, 123
Topography 20, 22, 26, 36, 52, 54, 57, 106, 185-187 (see also under regional descriptions)
Tram-roads (32), 46, 57, 71, 77, 81, 91, 94, 97, 102, 103, 107, 113, 121, 182
Treeless areas 86, 90, 154
Tropical vegetation 18, 125
Troy 97, 100, 160
Tsuga 49, 136, 189
Tunnels in coastal plain 98
Tuomey, M. 14, 37, 47, 53, 58, 67, 84, 86, 92, 97, 104, 113, 123, 126
Tupelo gum 34, 44, 46, 61, 62, 76, 77, 83, 84, 88, 91, 101, 110, 117, 125, 126, 134, 150, 198-201
Turkey oak 80, 82, 93, 101, 105, 110, 117, 152

Turpentine, turpentine stills, 57, 107, 112, 119-122, 170, 178, 180, 202-204 (see also Naval stores)
Tuscahoma formation 97
Tuscaloosa 10, 14, 74, 80, 150, 180, 188
" County 11, 25, 54, 57, 78, 79, 150, 152, 180, 204
" formation 72, 73, 78, 95, 114
Tuscumbia limestone 41
" spring 42
Tuskegee 10, 88
Tyty 75, 80, 83, 93, 106, 110, 111, 117, 128, 176

U

Ulmus (not specified) 132, 200
" *alata* 39, 44, 55, 61, 69, 75, 82, 87, 93, 96, 101, 106, 190
" *Americana* 39, 43, 55, 61, 75, 87, 96, 101, 125, 190, 198
" *fulva* 44, 55, 61, 87, 190
" *serotina* 55, 190
Umbrella rods 206
Union Springs 88, 91, 92, 188
Uniontown, climate of, 86, 188
United States Bureau of Soils 14, 15, 20, 22, (38, 78, 85, 95, 113, 126)
" " Census 12, 13, 29, 32, (56), 83, 119, 193, 197, 199, 200, 204
" " Forest Service 11, (12), 13, 32, 197, 199
" " Geological Survey 9, 14, 24
" " National Herbarium 12
" " Post Office Dept. 41
" " Weather Bureau, 24, 188
Upland willow oak 80 (see *Quercus cinerea*)

V

Valley Head 59
Vance, L. J., article by, 204
Vehicles and parts 32, 199 (see also Buggies, Hubs, Spokes, Wagons)
Veneers 32, 102, 123, 197, 201
Verbena, scene near, 146
Viburnum rufidulum 44, 50, 56, 61, 70, 76, 88, 106, 191
Vicksburg formation 104, 108
Vitis 156

W

Wagon factories, wagons, 40, 46, 63, 91
Walker County 54, 56, 57, 140
Walnut (black) 43, 44, 46, 55, 60, 74, 87, 105, 132, 200
Walnuts 46
Warrior coal field 12, 13, 52, 53
" River 11, 54-57, 73, 75, 79, 138, 150, 191
Washington County 104, 114, 119, 120, 178
Waste-burners 77, 80, 97, (121), 182
Water oak 34, 43, 50, 51, 55, 60, 69, 75, 80, 82, 87, 93, 96, 101, 106, 110, 117
Waterfalls 53, 65, 136, 138
Water-power 35, 68
Webb, R. D., article by, 15, 84, 95
Webster's Dictionary 83
Weeds 89
West Virginia 52
Wetumpka, fall-line at, 68
Wheel stock 202 (see also Hubs and Spokes)
Wheeling, scene near, 144
White cypress 33
" oak 33, 39, 40, 43, 46, 47, 50, 52, 55, 57, 60, 62, 65, 69, 71, 74, 75, 77, 79, 82, 84, 87, 91, 93, 94, 96, 97, 99, 100, 103, 105, 107, 110, 117, 121, 132, 198, 201
" pine 3, 46, 57, 62, 71, 77, 87, 91, 94
Wilcox County 99
Wild cherry 44, 56, 69, 75, 110
" olive 160 (see *Osmanthus*)
" plum 44, 56, 61, 88
Wilkinson, J. A. 11, 15
Willow 39, 43, 50, 55, 60, 69, 74, 79, 82, 87, 93, 96, 100, 105, 110, 117, 125
Willow oak 34, 39, 43, 55, 60, 69, 75, 82, 87, 93, 96, 101, 106, 117, 198

Wills's Valley 58, 59
Winchell, A., paper by, 15, 97
Wind, effects of, 127
Winston County 48, 49, 54, 136
Wire-grass country 90, 109
Witch-hazel 160
Women in black belt 89, 90
Wood-burning locomotives, 112, 122, 183
Wood distillation 122, 203
Woodenware 199
Wood's Bluff formation 97
Woodville, scenes at or near, 132, 180
Worms in soil 17

X

Xanthoxylum Clava-Herculis 88

Y

Yaupon 109-111, 117, 164
Yellow-wood 56

Z

Zones, geographical, 20

GEOLOGICAL SURVEY CORPS, 1913.

Eugene Allen Smith, Ph. D., LL. D.----------State Geologist
William F. Prouty, Ph. D----------Chief Assistant
Robert S. Hodges----------Chemist
Herbert H. Smith----------Curator of Museum
Mrs. Herbert H. Smith----------Voluntary Assistant Curator
Roland M. Harper, Ph. D.----------Botanist
George N. Brewer----------Field Assistant
C. A. Abele-----Clerk in charge of Statistics of Mineral Production
James A. Anderson----------Clerk in charge of Mailing List
A. T. Donoho----------Stenographer

RIVER GAUGE HEIGHT OBSERVERS.

C. J. Stowe----------Jackson's Gap, Tallapoosa River
J. E. Whitehead----------Riverside, Coosa River
Lomax Estes----------Epes, Tombigbee River
W. G. Early----------Pera, Pea River
S. T. Dillard----------Beck, Conecuh River

From the records of daily observations of the gauge readings at these places when extended through sufficient time, the calculations of available horsepower to be obtained from the different streams are made.

PREVIOUS PUBLICATIONS

OF THE

GEOLOGICAL SURVEY OF ALABAMA.

THE publications of the Survey comprise (1) Administrative reports, (2) Reports of Progress, (3) Special reports, (4) Monographs, (5) Bulletins, (6) Circulars, (7) Maps, and (8) Museum papers. A series of County reports is planned for the near future.

The administrative reports contain little or nothing of scientific interest, and are published in limited editions, not intended for general distribution. The reports of progress were discontinued long ago, and are no longer available for distribution. The special reports mostly deal with a single coal field, mountain, valley, or series of formations, while the monographs treat of some industry, resource, or group of organisms throughout the state, or as far as it extends. The bulletins deal with a considerable variety of subjects, but are usually smaller and less technical than the monographs and special reports. The museum papers deal with our museum and the collections therein, and museum problems in general, and are not sent to a regular mailing list, but only to persons and institutions specially interested in such matters.

Special report no. 10 is sold for one dollar, while all the other publications still available are distributed gratuitously except for the amount of postage. No postage is asked for the circulars and small geological map, or for publications sent to foreign countries. Unless otherwise indicated, all publications of the first five classes are octavos, in paper covers. The larger maps are folded and enclosed in stout manila envelopes appropriately labeled.

Requests for publications should be addressed to

EUGENE A. SMITH,
State Geologist,
University, Ala.

ADMINISTRATIVE REPORTS.

(ALL BY EUGENE A. SMITH.)

Report for 1873. 8 pp.
Report for March 31, 1883, to Sept. 30, 1884. (Included in Special report no. 1, pp. 563-570. Not printed separately.)
Report for Oct. 1, 1884, to Sept. 30, 1888. 24 pp.
Report for Oct. 1, 1888, to Sept. 30, 1890. 18 pp.
Report for Oct. 1, 1890, to Sept. 30, 1892. 22 pp.
Report for 1894-1896. 18 pp.
Report for 1896-1898. 21 pp.
Report for 1902-1906. 19 pp.
Report for 1906-1910. 19 pp.

REPORTS OF PROGRESS.

(BY EUGENE A. SMITH.)

(All now out of print.)

1. Report of progress for 1874. 139 pp. 1875. Devoted to the Archaean or Metamorphic region.

2. Report of progress for 1875. 220 pp. 1876. Chiefly devoted to the Paleozoic formations of Bibb, Shelby, Talladega and Calhoun Counties. Contains chapters on coal mining by T. H. Aldrich and R. P. Rothwell, on coal plants by Leo Lesquereux, on the cotton worm by A. R. Grote, and a posthumous report on the Cahaba coal field by M. Tuomey.

3. Report of progress for 1876. 100 pp. 1876. Chiefly devoted to the Silurian formations of Roup's and Jones's Valleys, and to the Coosa coal field. Contains a catalogue of the freshwater and land shells of Alabama, by James Lewis, and a small map of the southwestern end of the Coosa coal field.

4. Report of progress for 1877 and 1878. 159 pp., 4 folded colored county maps. 1879. Chiefly devoted to the Tennessee valley and the Warrior coal field. Contains a chemical report by Henry McCalley.

5. Report of progress for 1879 and 1880. 158 pp., 2 maps. 1881. Chiefly devoted to the western part of the Warrior coal field and to that part of the state lying north of the Tennessee River; the former part prepared with the assistance of Joseph Squire, and the latter written by Henry McCalley.

SPECIAL REPORTS.

1. On the Warrior coal field; by Henry McCalley. 571 pp. 1886. **Exhausted.**

2. Report on the Cahaba coal field; by Joseph Squire. With an appendix on the geology of the valley regions adjacent to the Cahaba coal field, by Eugene A. Smith. 189 pp., 7 plates, and folded map in pocket. 1890. Cloth-bound. **Exhausted.**

3. Report on the Coal Measures of the plateau region of Alabama; by Henry McCalley. Including a report on the Coal Measures of Blount County by A. M. Gibson. 238 pp., map, and folded colored plate of geological sections. 1891. **Exhausted.**

4. Report on the geological structure of Murphree's Valley, and its minerals and other materials of economic value; by A. M. Gibson. 132 pp. 1893. **Postage 3 cents.**

5. Report on the Coal Measures of Blount Mountain; by A. M. Gibson. 80 pp., map and sections. 1893. **Exhausted.**

6. Report on the geology of the coastal plain of Alabama; by Eugene A. Smith, Lawrence C. Johnson, and Daniel W. Langdon, Jr.; with contributions to its paleontology, by T. H. Aldrich and K. M. Cunningham. xxiv + 759 pp., 29 plates (including several folded charts of sections). 1894. **Exhausted.**

7. Report on the Coosa coal field; by A. M. Gibson. 143 pp., one plate of sections. 1895. **Exhausted.**

8. Report on the valley regions of Alabama (Paleozoic strata); by Henry McCalley. Part 1. On the Tennessee valley region. xvii + 436 pp., 9 plates (one of which is a map for this and the next). 1896. **Postage 10 cents.**

9. (Same), Part 2. On the Coosa valley region. xxii + 862 pp., 26 plates (one of which is a folded chart of geological sections for this and the preceding). 1897. **Postage 20 cents.**

10. Report on the Warrior coal basin; by Henry McCalley. xiii + 327 pp., 7 plates (all folded charts of sections), and large folded map. 1900. **Price $1.00. Postage 16 cents additional.** (Can be

had with either pasteboard or paper covers; the latter untrimmed and more suitable for binding.)

MONOGRAPHS.

1. Report for the years 1881 and 1882, embracing an account of the agricultural features of the state; by Eugene A. Smith. xvi + 615 pp., 8 colored maps. 1883. Cloth-bound. **Exhausted.**

2. List of the fresh-water and marine Crustacea of Alabama, with descriptions of the new species and synoptical keys for identification; by C. L. Herrick. Large quarto. 56 pp., 8 plates. Oct. 1887. (From Memoirs of the Scientific Laboratories of Denison University.) **Exhausted.**

3. Iron making in Alabama; by Wm. B. Phillips. 164 pp. 1896. **Exhausted.**

4. Iron making in Alabama, second edition; by Wm. B. Phillips. viii + 380 pp. 1898. **Exhausted.**

5. Plant life of Alabama. An account of the distribution, modes of association, and adaptations of the flora of Alabama, together with a systematic catalogue of the plants growing without cultivation in the state; by Charles Mohr. xii + 921 pp., colored map, 2 half-tone portraits, and 12 other plates (line-engravings of certain Alabama plants). Oct., 1901. (Published jointly with U. S. National Herbarium.) **Postage 32 cents.** (The bulk of our edition is bound in black cloth, but not very substantially. Persons desiring to put on better bindings of their own can have untrimmed copies in paper covers by signifying a desire to that effect.)

6. The underground water resources of Alabama; by Eugene A. Smith. xvi + 388 pp. 30 plates. 1907. Cloth-bound (some in red and some in black). **Postage 15 cents.**

7. Iron making in Alabama, third edition; by Wm. B. Phillips. 254 pp., 31 plates. Dec., 1912. Cloth-bound (but a few paper-covered copies are available for those who may prefer them). **Postage 13 cents.**

BULLETINS.

1. Preliminary report on the Tertiary fossils of Alabama and Mississippi; by T. H. Aldrich. Contributions to the Eocene paleontology of Alabama and Mississippi; by Otto Meyer. 85 pp., 9 plates, 1886. **Exhausted.**

2. On the phosphates and marls of Alabama; by Eugene A. Smith. 82 pp. 1892. **Exhausted.**

3. A preliminary report on a part of the lower gold belt of Alabama, in the counties of Chilton, Coosa and Tallapoosa; by Wm. B. Phillips. 97 pp., 4 plates (including map). 1892. **Exhausted.**

4. Report on the geology of northeastern Alabama and adjacent portions of Georgia and Tennessee; by C. Williard Hayes. 86 pp., 2 colored plates (one of which is a folded geological map). 1892. **Exhausted.**

5. A preliminary report on the upper gold belt of Alabama, in the counties of Cleburne, Randolph, Clay, Talladega, Elmore, Coosa and Tallapoosa; by Wm. M. Brewer. Supplementary notes on the most important varieties of the metamorphic or crystalline rocks of Alabama, their composition, distribution, structure, and microscopic characters; by Eugene A. Smith, G. W. Hawes, J. M. Clements and A. H. Brooks. vii + 202 pp., 3 plates. 1896. **Postage 5 cents.**

6. Preliminary report on the clays of Alabama; by Heinrich Ries. (Includes chapter on the geological relations of the clays of Alabama, by Eugene A. Smith.) viii + 220 pp. 1900. **Exhausted.**

7. A preliminary report on a part of the water-powers of Alabama; by B. M. Hall. 188 pp., map and 4 plates. 1903. **Exhausted.**

8. The materials and manufacture of Portland cement; by Edwin C. Eckel. The cement resources of Alabama; by Eugene A. Smith. 93 pp., 16 plates (including colored geological map of the state). 1904. **Postage 4 cents.** (The map can be had separately. See list of maps, below.)

9. Index to the mineral resources of Alabama; by Eugene A. Smith and Henry McCalley. 79 pp., map (same as in Bull. 8) and 6 plates. 1904. **Postage 3 cents.**

10. Reconnoissance report on the Fayette gas field, Alabama; by M. J. Munn. (In co-operation with the U. S. Geological Survey.) 66 pp., outline map, folded chart of sections, and folded colored geological map. Oct., 1911. **Postage 4 cents.**

11. Roads and road materials of Alabama; by Wm. F. Prouty. (Includes chapters by Thos. M. Owen, R. P. Boyd, J. T. Bullen, W. S. Keller, and E. B. Kay.) 148 pp., 20 plates (including colored map). Oct., 1911. **Postage 6 cents.**

12. Statistics of the mineral production of Alabama for 1910; by C. A. Abele and others. 51 pp. 1912. **Postage 2 cents.**

13. Statistics of the mineral production of Alabama for 1911; by C. A. Abele and others. 64 pp. April, 1913. **Postage 2 cents.**

CIRCULARS.

1. Documents showing the nature of the work done by the U. S. Geological Survey in the states. 3 pp. Jan., 1895.

2. Abstract of Alabama clay tests. 1 p., quarto size. Nov., 1897. **Exhausted.**

3. List of publications. (This is revised at frequent intervals, and only the latest edition is kept in stock.)

MAPS.

(Not including those which are bound with other publications and not distributed separately.)

1. Geological map of Alabama (in colors), 24 x 38 in., scale 10 miles to the inch; by Eugene A. Smith. Accompanied by an explanatory chart of the same size. 1894. **Exhausted.**

2. Map of the Warrior coal basin, with columnar sections; by Henry McCalley. 35 x 39 inches. Nov., 1899. (Belongs with Special report no. 10; not distributed separately.)

3. Geological map of Alabama, in colors; by Eugene A. Smith. 8½ x 11 in. 1904. (Bound with Bulletins 8 and 9, and also distributed separately.)

4. Revised map of the southeastern part of the Cahaba coal field; compiled mainly from the map of Joseph Squire and field notes by George N. Brewer; by Eugene A. Smith. 21 x 27 in. (Not colored.) 1905. **Postage 2 cents.**

5. Map of the Coosa coal field (colored), with sections; by Wm. F. Prouty. 31 x 41 in. Dec., 1912. **Postage 2 cents.**

MUSEUM PAPERS.

1. Smith Hall, the new museum and home of the Geological Survey. 7 pp., 1 plate. May, 1910. **Postage 1 cent.**

2. The museum as an educator; by Herbert H. Smith. 25 pp., 8 plates. May, 1912. **Postage 3 cents.**

3. Directions for collecting land shells, penniwinkles, and mussel shells; by Herbert H. Smith. 12 pp. (1912.) **Postage 1 cent.**

GEOLOGICAL SURVEY OF ALABAMA
WALTER BRYAN JONES, STATE GEOLOGIST

MONOGRAPH 9

ECONOMIC BOTANY OF ALABAMA

PART 2

CATALOGUE OF THE TREES, SHRUBS AND VINES OF ALABAMA, WITH THEIR ECONOMIC PROPERTIES AND LOCAL DISTRIBUTION.

BY ROLAND M. HARPER

UNIVERSITY, ALABAMA
1928

GEOLOGICAL SURVEY OF ALABAMA
WALTER BRYAN JONES, STATE GEOLOGIST
IN COOPERATION WITH
STATE COMMISSION OF FORESTRY
PAGE S. BUNKER, STATE FORESTER

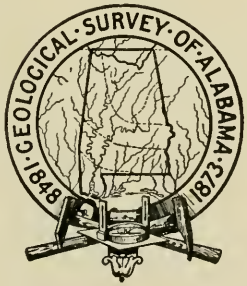
MONOGRAPH 9

ECONOMIC BOTANY OF ALABAMA

PART 2

CATALOGUE OF THE TREES, SHRUBS AND VINES OF ALABAMA, WITH THEIR ECONOMIC PROPERTIES AND LOCAL DISTRIBUTION.

BY ROLAND M. HARPER



UNIVERSITY, ALABAMA
1928

BIRMINGHAM PRINTING COMPANY
BPCo.
PUBLISHERS

LETTER OF TRANSMITTAL

To His Excellency,
Governor Bibb Graves,
Montgomery, Alabama:

Dear Sir:

I have the honor to transmit herewith Part 2 of a report on the Economic Botany of Alabama, by Roland M. Harper, to constitute the ninth of the Survey's series of Monographs.

The first work under this general title (Monograph 8), which divided the state into natural regions, and discussed the composition and utilization of the forests in each region, was published in 1913. The second part, herewith transmitted, classifies the same forests by species, giving for every kind of tree, shrub and woody vine known to grow wild in the state its economic properties and local distribution. Later parts in contemplation will take up some of the useful herbs, noxious weeds, etc.

Since the publication of Part 1 the author has continued his explorations of Alabama intermittently (alternating with similar work in other states), for periods ranging from a few days to several months in most of the intervening years. On account of the Survey's limited funds, some of his traveling in recent years has been done at his own expense; and for over six months in 1927 the State Commission of Forestry bore the entire expense of the work in order to expedite its completion. Our thanks are therefore due to Col. Page S. Bunker, State Forester, for making possible its appearance at this time.

Very respectfully,

WALTER B. JONES,
State Geologist.

University, Ala., June, 1928.

GEOLOGICAL SURVEY CORPS

Walter B. Jones, Ph.D.	State Geologist
Jelks Barksdale, B.S.	Staff Geologist
Douglas R. Semmes, Ph.D.	Geologist
George I. Adams, D.Sc.	Geologist
Roland M. Harper, Ph.D.	Geographer
Robert S. Hodges, D.Sc.	Chemist
Elizabeth Jennings, A.B.	Secretary
William L. Haltom, A.B.	Curator of the Museum
Mrs. Herbert H. Smith	Assistant Curator
Minnie Mae Walker	Stenographer

COMMITTEE ON SURVEY PUBLICATIONS

His Excellency, Bibb Graves, Governor of Alabama.

Hon. John Brandon, Secretary of State.

Dr. Walter B. Jones, State Geologist.

TABLE OF CONTENTS

	Page
Introduction	9-38
Work of Dr. Mohr and his contemporaries	9-10
Field work of the writer	10-11
Literature cited	12-22
Principles of classification	23-25
Nomenclature	25-26
Definition of tree, shrub, etc.	27-29
Method of treatment	29-32
Natural regions, soil and climate	32-38
Systematic catalogue	39-323
(For list of families see pp. 325-326.)	
Gymnosperms	39-72
Angiosperms	72-323
Monocotyledons	72-86
Dicotyledons	87-323
Apetalae	87-160
Polypetalae	160-284
Gamopetalae	285-323
Summary of the catalogue	324-327
Distributional notes	328-339
Additions and corrections	339-340
Index	341-357

LIST OF ILLUSTRATIONS

MAPS

		Page
1.	Natural regions	33
2.	Soil fertility	34
3.	Average temperature	35
4.	Winter rainfall	36
5.	Summer rainfall	37
6.	*Pinus palustris*	44
7.	*Pinus Elliottii*	48
8.	*Pinus Virginiana* and *Pinus glabra*	57
9.	*Taxodium* (two species)	64
10.	*Juniperus Virginiana*	71
11.	Three palms	81
12.	*Myrica* (four species)	98
13.	*Quercus montana*	117
14.	*Quercus Catesbaei*	128
15.	*Quercus cinerea*	132
16.	*Magnolia glauca* and *Magnolia grandiflora*	165
17.	*Magnolia macrophylla*	170
18.	*Illicium Floridanum*	175
19.	*Hydrangea quercifolia*	189
20.	*Cyrilla* and *Cliftonia*	242
21.	*Ilex glabra* and *Ilex myrtifolia*	245
22.	*Nyssa uniflora*	284
23.	*Osmanthus Americana*	308

HALF-TONE FIGURES

1.	*Pinus palustris*, Baldwin County	40
2.	*Pinus palustris*, Covington County	41
3.	*Pinus palustris* (turpentined), Mobile County	42
4.	*Pinus Elliottii*, Baldwin County	47
5.	*Pinus Taeda*, Tuscaloosa County	49
6.	*Pinus Taeda* (trunk) Tuscaloosa County	50
7. 8.	*Pinus scrotina*, Autauga County	52
9.	*Pinus echinata*, Tuscaloosa County	53
10.	*Pinus glabra*, Pike County	55
11.	*Pinus glabra* (trunk) Dale County	56
12.	*Pinus Virginiana*, Tuscaloosa County	59
13.	*Taxodium distichum*, Tuscaloosa County	62
14.	*Taxodium distichum*, Montgomery County	63
15.	*Taxodium ascendens*, Baldwin County	66
16.	*Juniperus Virginiana*, Jefferson County	69
17.	*Juniperus Virginiana* (burned), Madison County	70
18.	*Arundinaria macrosperma*, Tuscaloosa County	74

19. *Arundinaria macrosperma*, Tuscaloosa County 75
20. *Arundinaria tecta*, Tuscaloosa County 77
21. *Rhapidophyllum Hystrix*, Conecuh County 80
22. *Hicoria Pecan*, Perry County 90
23. *Hicoria Pecan*, Marengo County 90
24. *Hicoria ovalis* (?), Jefferson County 93
25. *Hicoria ovalis* (?) 95
26. *Hicoria ovalis* (?) 96
27. *Fagus grandifolia*, Morgan County 107
28. *Quercus Virginiana*, Mobile County 120
29. *Quercus velutina*, Tuscaloosa County 123
30. *Quercus Catesbaei*, Autauga County 127
31. *Quercus Marylandica*, Elmore County 130
32. *Quercus Arkansana* (?) (trunk), Pike County 133
33. *Quercus Arkansana* (?), Pike County 135
34. *Quercus Arkansana* (?) 136
35. *Quercus obtusa*, Lowndes County 138
36. *Quercus laurifolia*, cultivated 139
37. *Quercus laurifolia* (twig) 140
38. *Quercus Phellos* and *Q. laurifolia*, cultivated 141
39. Same trees 22 years later 141
40. *Quercus Phellos* (twig) 143
41. *Ulmus alata*, Madison County 145
42. *Planera aquatica*, Baldwin County 148
43. *Celtis Mississippiensis* (?) Sumter County 150
44. *Phoradendron flavescens*, Tuscaloosa County 156
45. *Magnolia grandiflora*, Autauga County 163
46. *Magnolia macrophylla*, Tuscaloosa County 169
47. *Illicium Floridanum*, Tuscaloosa County 174
48. 49. *Sassafras variifolium*, Tuscaloosa County 182
50. *Hydrangea quercifolia*, Bibb County 187
51. *Hydrangea quercifolia*, cultivated 188
52. *Neviusia Alabamensis*, cultivated 195
53. Flowers of same 196
54. *Gleditsia triacanthos*, Jackson County 219
55. *Cladrastis tinctoria*, Tuscaloosa County 221
56. *Croton Alabamensis*, Tuscaloosa County 228
57. *Croton Alabamensis* (flowers) 229
58. *Cotinus Americanus* (trunk), Madison County 233
59. Tops of same trees 234
60. *Cotinus Americanus*, Morgan County 235
61. *Cotinus Americanus* (flowers) 236
62. *Aesculus parviflora*, Tuscaloosa County 258
63. *Cornus florida*, Baldwin County 277
64. *Nyssa biflora*, Lawrence County 281
65. *Nyssa uniflora*, Limestone County 283
66. *Kalmia latifolia*, DeKalb County 290

INTRODUCTION.

WORK OF DR. MOHR AND HIS CONTEMPORARIES

Dr. Charles Mohr's great work, the Plant Life of Alabama, a book of over 900 pages, published jointly by the United States National Herbarium and the Geological Survey of Alabama shortly after the author's death in 1901, gives for all the flowering plants known in the state at that time (about 2400 species and varieties) their bibliographic history, general and local distribution, and a few words on their economic properties (if any). Dr. Mohr made no special effort to cover the state thoroughly with his botanical explorations, no funds having been allotted for that particular purpose during his lifetime. His field work seems to have been chiefly restricted to the vicinity of Mobile, his home, and Cullman, where he spent several summers with a brother who lived there, and to a few trips made for the Louisville and Nashville Railroad and the United States Department of Agriculture to important timber regions, such as Clay, Washington and Escambia Counties. (In the preface of his book he expresses his indebtedness to the presidents of the three railroads which entered Mobile at that time, presumably indicating that he enjoyed free transportation on them.)

For information about other parts of the state he depended largely on contemporary local botanists, such as Prof. M. C. Wilson at Florence, Dr. Eugene A. Smith at Tuscaloosa, Prof. F. S. Earle and several associates at Auburn, and on the records left by some of his predecessors, chiefly Buckley, Peters, and Denny.*

*Scattered through Mohr's Plant Life are references to about forty species of vascular plants reported from Suggsville, or from Clarke County without definite locality, by a Dr. Denny; but he is not mentioned in the introductory chapter dealing with the history of botanical exploration, and his first name appears nowhere in the book. From other sources it has been ascertained that he was Andrew Denny, M.D., who was born in Massachusetts in 1812, settled at Suggsville about 1836, and died at Jackson about 1870. He is said to have been the leading physician of Clarke County in his day (and also somewhat of an inventor); and he published a paper on the medicinal plants of Clarke County in 1852 (see bibliography below), which may have been known to Dr. Mohr.

Dr. Mohr's book contains the names of about seventy botanists who contributed something to the knowledge of the flora of Alabama by collecting specimens, etc., but a considerable number of them worked on fungi only.

The names of a few other botanists who worked in Alabama before or since Dr. Mohr's time are indicated in the bibliography of the present report, but some others have left no records of their work other than specimens deposited in various herbaria.

Like nearly all other botanists who have worked on plant distribution, before and since, Dr. Mohr does not seem to have made full notes while traveling (especially by rail), but must have depended mostly on dried specimens, literature, and memory. But he did remarkably well under the circumstances, and his book is still without much doubt the best state flora ever published.

Considering woody plants only, in addition to nearly 100 species which are so widely distributed in Alabama that Dr. Mohr did not attempt to list the counties in which he had seen them, he reported 148 species from Mobile County, 89 from Baldwin, 69 from Tuscaloosa (mostly on the authority of Dr. Smith), 46 from Clarke (mostly by Dr. Denny), 41 from Montgomery, 37 from Clay, 37 from Lee (nearly all by Prof. Earle and his associates), 32 from DeKalb, and so on; but none from Bullock, Chambers, Conecuh, Coosa, Covington, Crenshaw, Geneva, Greene, Lowndes, Pickens, or Shelby, although he must have often passed through some of these on the train. The southeastern corner of the state is very sparingly represented by any plant records in the book.

FIELD WORK OF THE WRITER

The present writer came to Alabama in the fall of 1905, and made it a point to visit every county in the state within a year, except one which had no railroad then; and that was visited in 1908 and later. By this time every county has been visited more than once, in different years, sometimes at state expense and sometimes on pleasure trips. Notes have been taken on practically every mile of travel by rail, for many of the commoner trees and shrubs are just as easily identified from a moving train as by herbarium specimens, and this makes my notes on their distribution far more complete than they would be otherwise.* In recent years considerable information has been gathered on automobile trips; but that

*The Legislature of 1919 enacted a law requiring the windows of intrastate passenger trains in Alabama to be screened. If that law had been in force when I first came to the state it would have been a considerable handicap to my work.

method of transportation has its disadvantages, for it is difficult to write legibly while traveling on a rough road, and good roads do not usually pass close to much natural vegetation. Long trips on foot have been made in most of the counties, enabling the verification of many tentative car-window identifications, and the finding of many species not visible at all from the highways.

A few hundred days of field work, scattered over a period of more than 22 years, have made the notes on distribution in the present report much more detailed than any hitherto attempted in Alabama or any neighboring state. The following catalogue is based on about 30,000 locality records for trees and half as many for shrubs. Of course no one ever lives long enough to explore every square mile of a state as large as ours, and a hundred years from now there may still be important areas in Alabama botanically unexplored. But our knowledge of the distribution of all the commoner trees is now reasonably complete, and future changes will consist mostly of discovering new localities for the rarer species (or the destruction of some localities now on record), and splitting species now regarded as one into two or more.

Some idea of the relative completeness with which different parts of the state have been explored by the writer may be afforded by the statement that his personal records show 92 native species of trees and 83 of shrubs and woody vines from Tuscaloosa County, 124 woody plants from Choctaw, 121 from Bibb, 120 from Chilton, 119 from Washington, 116 from Sumter, 113 from Clarke, 112 from Covington, Jefferson and Talladega, 111 from Baldwin, 110 from Pike, 108 from Geneva, 106 from Clay, 105 from Butler, Elmore and Monroe, 103 from Autauga, etc.*

*These counts were made a few years ago, and subsequent field work, particularly in 1927, when special attention was given to parts of the state more easily reached from Montgomery than from Tuscaloosa, would increase the figures for some of these counties, especially Autauga, Clarke and Monroe. Some of the counties from which I have the fewest records were covered pretty well by Dr. Mohr or some of the other collectors cited in his book. Every county is mentioned in the catalogue, however.

LITERATURE CITED.

The writer's notes on the distribution and utilization of our woody plants have been supplemented by examination of all the easily available literature on the subject (Mohr's Plant Life of Alabama first and foremost, of course), and by written and oral communications about a few species by interested persons. All such information is properly credited, and doubtful cases allowed for as far as possible. Reports of additional discoveries will of course always be gratefully received, and utilized if this catalogue should ever be revised.

The following bibliography includes several different kinds of publications, as follows:

1. General works, giving the distribution or uses of the woody plants of the southeastern United States, or some larger area.

2. Works similar in scope to this on other states, which have been taken as models in some respects.

3. Pamphlets or papers dealing with the classification or utilization of certain genera or species represented in our list.

4. Papers dealing specifically with Alabama trees or shrubs.

Completeness is not attempted in either of these groups. The aim has been to cite only works that are important or easily accessible, or both, with an occasional exception in favor of some rare one that has been overlooked by many bibliographers. Those in the first and third classes are mostly government bulletins, partly because the U. S. Forest Service has published more information on the utilization of our trees than any other organization in this country, and partly because government bulletins are printed in large editions, and easily found in libraries if not still available for free distribution. Some papers in the third class, which deal with only one species, are referred to at the proper place in the catalogue instead of being listed in this bibliography. In the last class it has not seemed worth while to repeat all the titles given in Economic Botany Part 1 (Monograph 8), for that is still available for distribution, and even after the reserve stock is exhausted it ought to be found in nearly every library that contains this report. In all there are about 139 titles by 80 authors.

All four classes are put in a single list, with the names of authors arranged alphabetically, and the works of each (if more than one) chronologically. In many cases, especially where the title itself is not sufficiently clear, enough explanatory notes are added to indicate the relation of the paper to the subject under discussion, or to guide the reader to additional sources of information. Many of the papers are referred to farther on in the catalogue, by author and number (e.g., Beadle 3, Mohr 5). The abbreviations of names of states, serials, etc., probably need no explanation.

Andrews (Miss) **E. F.**

1. Agency of fire in propagation of long-leaf pines.—Bot. Gaz. 64:497-508, figs. 1-5. Dec. 1917.

2. The relation between age and area in the distribution of plants.—Science II.47:142-143. Feb. 8, 1918.

(Refers to the rapid spread of Japanese honeysuckle *(Lonicera Japonica)* in the southeastern states.)

3. The Japanese honeysuckle in the eastern United States.—Torreya 19:37-43. 1919.

Ashe, W. W.

1. Chestnut in Tennessee.—Tenn. Geol. Surv., Bull. 10 B. 35 pp. 1912.

2. Yellow poplar [*Liriodendron*] in Tennessee.—Tenn. Geol. Surv., Bull. 10 C. 56 pp., 8 half-tones in text. 1913.

3. Loblolly or North Carolina pine [*Pinus Taeda*].—N. C. Geol. Surv., Bull. 24. 169 pp., 2 maps in text, 27 plates. 1915.

4. Magnolia cordata and other woody plants.—Bull. Torrey Bot. Club 54:579-582. 1927.

(See also Foster & Ashe, Greeley & Ashe, Pinchot & Ashe.)

Bailey, L. H.

1. Cyclopedia of American Horticulture.—Quarto, 4 vols., 1900-1902.

2. The Standard Cyclopedia of Horticulture.—6 vols., 1914-1917. (Revised 1922.)

(These two works are useful for indicating which of our woody plants are cultivated for ornament, etc.)

Bates, F. A. (M. D.)

Indigenous botany of Perry County.—Proc. Med. Assoc. State of Ala., 6:58-68. 1853.

(Medicinal plants mostly. Includes some cultivated species, and a few whose occurrence in Perry County is very improbable.)

Beadle, C. D.

1. Studies of Crataegus.—Botanical Gazette, 28:405-417. "Dec. 1899."

(Describes seven new species, all but one credited to Alabama, but none confined to the state.)

2. Studies in Crataegus. II.—Bot. Gaz. 3:355-346. Nov. 1900.

(Describes ten species, all new, seven known only from Alabama, and two from Alabama and other states.)

3. New species of thorns [*Crataegus*] from the southeastern states.—Biltmore Botanical Studies, 1:25-47. 1901.

(Describes 21 species, 10 of them from Alabama.)

4. A shrubby oak of the southern Alleghanies.—Biltmore Bot. Studies, 1:47-48. 1901.

(*Quercus Boyntoni*, from the south end of Lookout Mountain.)

5. New species of thorns [*Crataegus*] from the southeastern states. II.—Biltmore Bot. Studies, 1:51-137. 1902.

(Describes 105 species, 31 of them from Alabama.)

6. Two drupaceous trees from Alabama.—Baltimore Bot. Studies, 1:162-163. 1902.

(*Prunus australis*, from Evergreen, and *P. mitis*, from Auburn; both proposed as new species.)

Betts, H. S.

Properties and uses of the southern pines.—U. S. Forest Service, Circular 164. 30 pp., 6 text-figs. 1909.

Boynton, C. L.

Notes from a collector's field-book.—Biltmore Bot. Studies, 1:143-150. 1902.

(Records *Ulmus scrotina, Hicoria Carolinae-septentrionalis* and *Acer leucoderme* from new Alabama stations, among other things.)

Brush, Warren D.

1. Utilization of sycamore.—U. S. Dept. Agriculture, Bull. 884. 24 pp., 3 text-figs., 4 plates. 1920.

2. Utilization of black walnut.—U. S. Dept. Agric., Bull. 909. 89 pp., 14 plates, several maps, etc., in text. 1921.

(A pretty comprehensive report on the walnut timber resources of the eastern United States.)

3. Utilization of basswood.—U. S. Dept. Agric., Bull. 1007. 64 pp., 8 plates. 1922.

Buckley, S. B.

1. Quercus Durandii, Buckley.—Proc. Acad. Nat. Sci. Phila. 121-122. 1881. (This species discovered in Wilcox County, Ala., in 1859.)

2. Rhus cotinoides, Nutt.—Ibid. 1881:125. 1882.

Bush, B. F.

The glabrate species of Tilia.—Bull. Torrey Bot. Club, 54:231-248. March 1927.

(Lists 11 species and several varieties, about half of them credited to Alabama.)

Cabell, P. H. (M. D.)

Report on the botany of Dallas County.—Trans. Med. Assoc. Ala., 8:40-53. 1855.

(Medicinal plants only. Species not always specified.)

Caldwell, [G. W.] ("Caldwell the Woodsman")

The story of the southern evergreens.—Country Life in America, 7:171-176. (Illustrated.) Dec. 1904.

(Describes the development of the evergreen decoration industry in Conecuh County since it was started by the author in 1888.)

Cary, C. A., Miller, E. R., & Johnstone, G. R.

Poisonous plants of Alabama.—Ala. Polytech. Inst. Extension Service, Circ. 71, 42 pp., 40 figs. 1924.

(Lists 4 trees, 14 shrubs and vines, and 41 herbs. Of the total number [59], 35 are native, 21 weeds, and 3 cultivated.)

Chesnut, V. K.
Principal poisonous plants of the United States.—U. S. Dept. Agric., Div. Botany, Bull. 20. 60 pp. 1898.

Chittenden, A. K., & Hatt, W. K.
The red gum [*Liquidambar*].—U. S. Bur. Forestry, Bull. 58. 56 pp., 7 text-figs., folded map, and 6 plates. 1905.

Clanton, S. W. (M. D.)
Report on the botany of Sumter County.—Trans. Med. Assoc. Ala. 8:32-40. 1855.
(Medicinal plants only. Includes a few cultivated species, and a few wrongly identified.)

Cocks, R. S.
Catalogue of trees growing naturally in the vicinity of Sardis, Dallas County, Alabama.—Jour. Arnold Arboretum, 6:189-195. "Oct. 1925."
(Lists 116 species and 14 varieties, forms and hybrids from an area of a few hundred acres bordering the Alabama River, but includes a few species probably introduced, and one or two which could hardly be expected in that part of the state. Of the forms listed about 70 could be called large trees, 47 small trees, and 13 shrubs.)

Cuno, John B.
Utilization of dogwood and persimmon.—U. S. Dept. Agric., Bull. 1436. 42 pp., 24 figs. "Sept." 1926.

Denny, A[ndrew], (M. D.)
Report on the indigenous botany of Clarke County.—Proc. Med. Assoc. Ala., 5:41-69. 1852; (Same) 6:30-22. 1853.
(Restricted to medicinal plants, of which about 85 species are listed, with notes on habitat, time of flowering, medicinal properties, etc. The second paper, with the same title, consists mostly of corrections for the first.)

Earle, F. S.
The flora of the metamorphic region of Alabama.—Ala. Agric. Exper. Sta., Bull. 119. 80 pp. Auburn, 1902.

Fernow, B. E.
Southern pine—mechanical and physical properties.—U. S. Div. Forestry, Circular 12. Quarto, 12 pp., 4 diagrams. 1896.

Fletcher, W. F.
The native persimmon.—U. S. Dept. Agric., Farmers' Bulletin 685. 25 pp., 17 figs. 1915.

Foster, H. D., & Ashe, W. W.
Chestnut oak in the southern Appalachians.—U. S. Forest Service, Circular 135. 23 pp. 1908.

Frothingham, E. H.
The eastern hemlock [*Tsuga Canadensis*].—U. S. Dept. Agric., Bull 152. 43 pp., 3 figs., 5 plates. 1915.

Grant, C. V. & Hansen, A. A.
Poison ivy and poison sumac and their eradication.—U. S. Dept. Agric., Farmers' Bull. 1166. 16 pp., 6 figs. Oct. 1920. (Reprinted Jan. 1922.)

Gray, Asa.
Neviusia, a new genus of Rosaceae.—Mem. Am. Acad. Arts & Sci., II. 6:373-376, pl. 30. 1859. (Discovered near Tuscaloosa by Drs. R. D. Nevius and W. S. Wyman in 1857. For further details see catalogue.)

Greeley, W. B., & Ashe, W. W.
White oak in the southern Appalachians.—U. S. Forest Service, Circular 105. 27 pp. 1907.

Greene, E. L.
Segregates of the genus Rhus.—Leaflets Bot. Obs. & Crit. 1:114-144. Nov. 1905.

Hall, W. L., & Maxwell, H.
1. Uses of commercial woods of the United States. I. Cedars, cypresses and sequoias.—U. S. Forest Service, Bull. 95. 62 pp. 1911.

2. (Do.) II. Pines.—Bull. 99. 96 pp. 1911.

Harbison, T. G.
A sketch of the Sand Mountain flora.—Biltmore Bot. Studies, 1:151-157. 1902.

Hare, H. A., Caspari, C. E., & Rushby, H. H.
National Standard Dispensatory.—viii + 1860 pp. Philadelphia, 1905.
(Discusses the properties, etc., of all plants commonly used in a medicinal way in this country.)

Harper, R. M.
1. Taxodium distichum and related species, with notes on some geological factors influencing their distribution.—Bull. Torrey Bot. Club, 29:383-399. June, 1902.
(Based mostly on observations in Georgia.)

2. Further observations on Taxodium.—Bull. Torrey Bot. Club 32: 105-115, figs. 1-7. 1905.
(Presents additional evidence of the distinctness of *T. distichum* and *T. imbricarium*.)

3. A December ramble in Tuscaloosa County, Alabama.—Plant World, 9:102, 104-107. 1906.
(Discusses some interesting plants seen along the shale cliffs of the Warrior River.)

4. Notes on the distribution of some Alabama plants.—Bull. Torrey Bot. Club 33:523-536. 1906.

5. The vegetation of Bald Knob, Elmore County, Alabama.—Plant World 9:265-269, fig. 44. 1907.

6. Competition between two oaks.—Plant World 10:114-117, figs. 20, 21. 1907.
(*Quercus Phellos* and *Q. laurifolia*, on the University campus.)

7. A botanical and geological trip on the Warrior and Tombigbee Rivers in the coastal plain of Alabama.—Bull. Torrey Bot. Club, 37:107-126, figs. 1, 2. 1910.

8. A few more pioneer plants found in the metamorphic region of Alabama and Georgia.—Torreya 10:217-222, fig. 1. 1910.
(Reports a few species from the Blue Ridge in Clay County which were previously known only from the coastal plain.)

9. The diverse habitats of the eastern red cedar and their interpretation.—Torreya, 12:145-154. July, 1912.

10. Five hundred miles through the Appalachian Valley [in Virginia, Tennessee and Alabama]—Torreya, 13:241-245. Oct. 1913.

11. The forest resources of Alabama.—American Forestry, 19:657-670, with regional map and 17 half-tones. Oct. 1913.

(This is an abstract of Monograph 8, with some of the same illustrations and a little new matter, especially about the relation of long-leaf pine to fire.)

12. The pocosin of Pike County, Alabama, and its bearing on certain problems of succession.—Bull. Torrey Bot. Club, 41:209-220. 1914.

(Contains among other things the first photograph ever published of what is now believed to be *Quercus Arkansana.)*

13. The coniferous forests of eastern North America.—Pop. Sci. Monthly, 85:338-361, with 16 half-tones. Oct. 1914.

(Forests discussed by species. Contains three Alabama views.)

14. A forest census of Alabama by geographical divisions.—Proc. Soc. Am. Foresters, 11:208-214. "April" [June], 1916.

15. A preliminary soil census of Alabama and West Florida.—Soil Science, 4:91-107, fig. 1 (regional map). Aug. 1917.

16. The supposed southern limit of the eastern hemlock.—Torreya, 19:198-199. Oct. 1919. (Locality in Jefferson County, Ala.)

17. The limestone prairies of Wilcox County, Alabama.—Ecology, 1:198-203, figs. 1, 2. 1920.

18. Alabama trees.—In Thomas M. Owen's "History of Alabama and dictionary of Alabama biography", vol. 1, pp. 606-608. Chicago, 1921.

(An annotated list of 83 of the more important species.)

19. A botanical bonanza in Tuscaloosa County, Alabama.—Jour. Elisha Mitchell Sci. Soc., 37:153-160, pl. 28. [April] 1922.

20. Some recent extensions of the known range of Pinus palustris.—Torreya, 23:49-51. June, 1923.

(Mentions its occurrence in Fayette County.)

21. A new heart-leaf and other interesting plants from Autauga County, Alabama.—Torreya, 24:77-83. Oct. 1924.

22. (Description of the natural features of Alabama.)—In "Naturalists' Guide to the Americas" (prepared by the Ecological Society of America), pp. 446-453. Baltimore, [March] 1926.

(Marred by numerous editorial alterations and typographical errors, and therefore not to be taken literally.)

Harris, J. T., & Maxwell, H.

The wood-using industries of Alabama.—Lumber Trade Journal (New Orleans), 61 (no. 9): 19-30. May 1, 1912.

Hatch, Charles F.

Manufacture and utilization of hickory, 1911.—U. S. Forest Service, Circular 187. 16 pp. 1911.

Hatch, Thos. P.

Floral calendar, for part of 1855, in Lauderdale County, Ala.—Am. Jour. Sci., 71:297-299. 1856.

(Relates to the vicinity of LaGrange College, which was on Little Mountain, in what is now Colbert County.)

Henkel, Alice.

Wild medicinal plants of the United States.—U. S. Dept. Agric. Bur. Plant Industry, Bull. 89. 76 pp. 1906.

Hill, C. L.
Wood paving in the United States.—U. S. Forest Service, Circular 141. 24 pp., 3 figs. 1908.

Holroyd, H. B.
The utilization of tupelo [*Nyssa uniflora*].—U. S. Forest Service, Circular 40. 16 pp., 4 figs. 1907.

Hopkins, A. D.
The dying of pine in the southern states: cause, extent, and remedy.—U. S. Dept. Agric., Farmers' Bull. 476. 15 pp., 4 figs. 1911.
(Discusses injury by bark-boring beetles.)

Jenkins, L. W. (M. D.)
Report on the botany of Wilcox County.—Trans. Med. Assoc. Ala., 7:111-116. 1854.
(Only 12 species listed, all medicinal, some woody.)

Kellogg, R. S.
Lumber and its uses. 3d edition, revised by Franklin H. Smith.—370 pp., 98 figs. New York, 1924.

Leavenworth, M. C.
List of the rare plants found in Alabama.—Am. Jour. Sci., 9:74. 1825.
(A list of 34 species, with localities given for most of them in one or two words.)

McAtee, W. L.
An account of poison sumachs, Rhus poisoning, and remedies therefor.—Medical Record (New York), 97:771-780. May, 1920.

Marsh, C. D.
A new sheep-poisoning plant of the southern states.—U. S. Dept. Agric., Circular 82. 4 pp. 1920.
(Refers to *Daubentonia longifolia*, a large woody herby or short-lived shrub, probably introduced from the tropics, and now common near the coast from West Florida to Texas.)

Mattoon, W. R.
1. The southern cypress.—U. S. Dept. Agric., Bull. 272. 74 pp., 7 figs., 12 plates. 1915. (Reviewed by B. E. F. [ernow] in Forestry Quarterly, 13:522-524 Jan. 1916.)
(The author treats our two easily recognized species of Taxodium as one, and makes no reference to publications of the present writer, in which the differences were pointed out more than ten years previously.—See Harper 1 and 2 in this bibliography.)
2. Short-leaf pine [*Pinus echinata*]: its economic importance and forest management.—U. S. Dept. Agriculture, Bull. 308. pp pp., 4 figs., 10 plates. 1915.
3. Slash pine [*Pinus Elliottii* and *P. Caribaea*].—U. S. Dept. Agric., Farmers' Bull. 1256. 41 pp., 21 figs. "May" 1922.
4. Long-leaf pine [*Pinus palustris*, or *australis*].—U. S. Dept. Agric., Bull. 1061. 50 pp., 6 figs., 22 plates. 1922.

Maxwell, Hu.
Uses of commercial woods of the United States. Beech, birches and maples.—U. S. Dept. Agric., Bull. 12. 56 pp. 1913.
(See also Hall & Maxwell, Harris & Maxwell.)

Mohr, Charles.

1. The forests of Alabama and their products.—Berney's Handbook of Alabama, pp. 221-235. 1878. (Abstracted in Gardeners' Chronicle [London] II. 11:604. May 10, 1879; and in Just's Bot. Jahresbericht 1878^2:1041-1043. 1882.)

2. Rhus cotinoides, Nutt.—Proc. Acad. Nat. Sci. Phila., 1882:217-220. Oct. 1882 (A German abstract, with the same title, appeared in the Pharmaceutische Rundschau, 1:6 Jan. 1883; and a shorter one in Just's Bot. Jahresbericht 1882^2:409-410. 1885.)

3. On the distribution of the more important forest trees in the Gulf region.—Am. Jour. Forestry (Cincinnati) 1:78-81, 120-126, 179-184, 200-216. Nov. 1882-Feb. 1883.

4. On Quercus Durandii, Buckley.—Proc. Acad. Nat. Sci. Phila. 1883:37-38. March, 1883. (Also in German in Pharm. Rundsch. 1:136. July, 1883; and abstracted in Just's Bot. Jahresb. 1883^2:211. 1886.)

5. Ueber die Verbreitung der Terpentin liefernden Pinusarten im Suden der Vereinigten Staaten und uber die Gewinnung und Verarbeitung des Terpentin.—Pharm. Rundsch. 2:163-166, 187-190. Aug. & Sept., 1884.

6. Rare and little known trees and shrubs of Alabama. [*Rhus cotinoides, Nevinsia Alabamensis*, and *Croton Alabamensis*].—Trans. Miss. Valley Hort. Soc., 2:216-219. 1884 (?). (Also in German in Pharm. Rundsch. 5:8-11 [with a figure of the *Croton*]. Jan. 1887; and abstracted in Die Natur 36:82-83. Feb. 12, 1887.)

7. Untersuchung der Blatter von Gleditschia triacanthos, L.—Pharm. Rundsch. 5:250. Nov. 1887.

8. The long-leaved pine.—Garden & Forest, 1:261-262. July 25, 1888.

9. The la[te]st addition to the shrubs of eastern North America. [*Croton Alabamensis*].—Garden & Forest, 2:592, fig. 150. Dec. 11, 1889.

10. Pinus glabra.—Garden & Forest, 3:295. June 18, 1890. (Reprinted in The Garden [London] 38:20. July 5, 1890; and translated into German by the author in Pharm. Rundsch. 8:208-209. Sept. 1890.)

11. The Florida spruce pine [*Pinus clausa*].—Garden & Forest 3:402-403. Aug. 20, 1890.

12. The medicinal plants of Alabama. Systematic list of the medicinal plants occurring within the limits of the state, with notes on their distribution and proper time of collecting the parts used.—8vo pamphlet, 17 pp. and cover. Mobile [1890]. (Said by Owen to be reprinted from the Proc. Ala. State Pharm. Assoc. Also in German in Pharm. Rundsch. 8:240-243, 257-262. Oct. & Nov., 1890.)

Lists 112 herbs (including a few introduced and cultivated species), 18 shrubs, 4 vines, and 25 trees.

13. Variations in the leaves of Clematis reticulata and other notes.—Bull. Torrey Bot. Club 19:308-309, pl. 133. Oct. 1892. (Abstracted in Just's Bot. Jahresb. 1892^1:365; 1893^2:269.)

(The "other notes" are on the discovery of *Quercus heterophylla* in Morgan County by Mohr and Sudworth.)

14. The mountain flora of Alabama[—Garden & Forest, 5:507-508. Oct. 26, 1892. (Also a German version in Pharm. Rundsch. 10:253-256. Nov. 1892.)

15. The distribution of some forest trees in the southern states.—Garden & Forest 6:372-373. Sept. 6, 1893.

(Discusses *Juniperus Virginiana, Arundinaria macrosperma, Hicoria myristicaeformis, H. Pecan*, and *Quercus Durandii*.)

16. Die Wälder des südlichen Alabama.—Pharm. Rundsch. 12:211-213. Sept. 1894.

17. Ueber das Vorkommen des Balsams von Liquidambar Styraciflua L.—Pharm. Rundsch. 13:57-58. March, 1895. (Abstracted in Just's Bot. Jahresb. 23 [1895][2]:387. 1898.)

18. The timber pines of the southern United States. (With an introduction by B. E. Fernow, and a discussion of the structure of their wood by Filbert Roth.)—U. S. Dept. Agric., Div. Forestry, Bull. 13. Quarto, 160 pp., 18 figs., 27 plates. 1895. (Revised the following year, with same illustrations, and additional notes on *Pinus heterophylla* and *P. serotina* by Dr. Roth, making 176 pages in all.) (First edition reviewed in Am. Jour. Pharm. 68:689-670. Dec. 1896; and abstracted in Just's Bot. Jahresb. 24[1896][2]:326, 480, 489-490. 1899; and in Bot. Centralblatt 70:288; and second noticed in Just 26^2:124, and Exp. Sta. Record 8:602-603. 1897.)

19. Notes on some undescribed and little known plants of the Alabama flora.—Bull. Torrey Bot. Club 24:19-28, pl. 289-291. Jan. 1897. (Abstract in Just's Bot. Jahresb. 25^2:209. 1900.)

(Contains the original description of *Vaccinium stamineum melanocarpum* [p. 25], among other things.)

20. Report on the forests of Sand Mountain.—The Forester 4:211-215. Oct. 1898.

21. Notes on some new and little known plants of the Alabama flora. —Bull. Torrey Bot. Club, 26:118-121. March, 1899. (Abstract in Just's Bot. Jahresb. 27^1:374.)

(Contains the original description of *Prunus Alabamensis,* among other things.)

22. Plant Life of Alabama.—Contrib. U. S. Nat. Herbarium, vol. 6. 921 pp., 13 plates (colored regional map and 12 line-drawings of new or rare plants). July 31, 1901. Also issued by the Geological Survey of Alabama, with the addition of a biographical sketch of the author (by Dr. E. A. Smith), and portraits of him and Judge T. M. Peters, in October, 1901. (Reviewed in Pharmaceutical Review [formerly Pharmaceutische Rundschau] 20:85-86. Feb. 1902.)

23. Notes on the red cedar.—U. S. Dept. Agric., Div. Forestry, Bull. 13. 37. pp., 13 figs., 3 plates. 1901.

Nellis, J. C.

Lumber used in the manufacture of wooden products.—U. S. Dept. Agric., Bull. 605. 18 pp. 1918.

Palmer, E. J.

Is Quercus Arkansana a hybrid?—Jour. Arnold Arboretum, 6:195-200. 1925.

(Answers the question in the negative, and mentions the occurrence of this species in Pike County, Ala.)

Pinchot, Gifford, & Ashe, W. W.

Timber trees and forests of North Carolina.—N. C. Geol. Surv., Bull. 6. 227 pp., 23 plates, and many small distribution maps in text. "1897" [1898].

(One of the best of the state tree catalogues.)

Pollard, C. L.

A visit to the home of Neviusia.—Plant World 3:136-137. 1900.

Porcher, F. P.

Resources of the southern fields and forests.—Ed. 1, xxv, 601 pp. Ed. 2. xv, 733 pp. Charleston, S. C., 1863 and 1869.

(Contains valuable notes on medicinal and other useful plants.)

Power, F. B., & Chesnut, V. K.

Ilex vomitoria as a native source of caffeine.—Jour. Am. Chemical Soc., 41:1307-1312. Aug. 1919.

Prentiss, A. N.
The hemlock.—Garden & Forest, 3:157-158. 1890.

Rehder, Alfred (See Wilson & Rehder).

Roth, Filibert. (See also Mohr, 18.)
Progress in timber physics. Bald cypress (Taxodium distichum).—U. S. Dept. Agric., Div. Forestry, Circ. 19. Quarto, 24 pp., 1 fig. 1898.
(The material was collected by Dr. Charles Mohr, and tested at St. Louis by Prof. J. B. Johnson. Our two species of cypress were treated as one, as was customary in those days.)

Sargent, C. S.
1. Notes on North American trees. I. Quercus.—Bot. Gaz. 65:423-459. 1918. (Gives new names to a few species occurring in Alabama.)
2. (Do.) III. Tilia.—Bot. Gaz. 66:421-438, 494-511. 1918.
(Proposes several new species, varieties and forms, some of them from Alabama.)

St. John, Harold.
A critical revision of Hydrangea arborescens.—Rhodora, 23:203-208. "Sept. 1921." [Jan. 1922.]

Schwarz, G. F.
The long-leaf pine in virgin forest.—16mo., xii + 135 pp., 23 full-page half-tone figures in text, colored map, and 2 folded diagrams. New York, (May) 1907.
(Based partly on studies made in Baldwin County, Ala.)

Smith, S. P. (M. D.) [Father of Eugene A. Smith.]
Report on the indigenous botany of Prattville.—Proc. Med. Assoc. Ala., 5:77-83. 1852.
(Medicinal plants only, about 33 species, with notes on habitat, medicinal properties, etc.)

Snow, Charles H.
1. The principal species of wood; their characteristic properties.—203 pp., 39 plates. New York, 1903.
2. Wood and other organice structural materials.—xviii + 478 pp. New York, 1917.
(Discusses the properties of many of our common trees.)

Stelle, (Prof.) J. P.
An outline expose of the geological, agricultural, hygienic, and other interesting characteristics of Mobile County, Alabama. 26 pp. Mobile, 1888. (For complete title see Monograph 8, p. 14.)
(Contains among other things valuable notes on the uses of various trees and shrubs.)

Sterrett, W. D.
1. Scrub pine (Pinus Virginiana).—U. S. Forest Service Bull. 94. 27 pp., 1 plate. 1911.
2. Forest management of loblolly pine [*Pinus Taeda*] in Delaware, Maryland, and Virginia.—U. S. Dept. Agric., Bull. 11. 1913.
3. The ashes [*Fraxinus*]: their characteristics and management.—U. S. Dept. Agric., Bull. 299. 88 pp., 16 plates, including folded map. 1915.
4. Utilization of ash [*Fraxinus*].—U. S. Dept. Agric., Bull. 523. 52 pp., 10 plates. 1917.

Sudworth, Geo. B.

1. Check list of the forest trees of the United States, their names and ranges.—U. S. Dept. Agric., Div. Forestry, Bull. 17. 144 pp. 1898.

2. (Second edition, with same title.)—U. S. Dept. Agric., Misc. Circ. 92. 295 pp. (May?), 1927.

Surface, H. E. & Cooper, R. E.

Suitability of long-leaf pine for paper pulp.—U. S. Dept. Agric., Bull. 72. 26 pp. 1914.

True, Rodney H.

Notes on the early history of the pecan in America.—Smithsonian Report 1917:435-448. 1919.

Von Schrenk, Hermann.

Sap-rot and other diseases of the red gum [*Liquidambar*].—U. S. Bur. Plant Industry, Bull. 114. 37 pp., 8 plates. 1907.

Wells, S. D., & Rue, J. D.

The suitability of American woods for paper pulp.—U. S. Dept. Agric., Bull. 1485. 101 pp. May, 1927.

Wheeler, Alvin S.

Juglone.—Jour. Elisha Mitchell Sci. Soc., 35:49-54, pl. 18. (Nov.?) 1919.

(A chemical study of dyestuffs obtained from walnut hulls—species not specified, but presumably *Juglans nigra*.)

White, L. L.

Production of red cedar for pencil wood.—U. S. Forest Service, Circular 102. 19 pp. 1907.

Wight, W. F.

1. The varieties of plums derived from native American species.—U. S. Dept. Agric., Bull. 172. 44 pp. 1915.

2. Native American species of Prunus.—U. S. Dept. Agric., Bull. 179. 75 pp., 4 figs., 13 plates. 1915.

Williamson, A. W.

Cottonwood [*Populus deltoides*] in the Mississippi Valley.—U. S. Dept. Agric., Bull. 24. 62 pp., 6 plates. 1913.

Wilson, E. H., & Rehder, Alfred.

A monograph of Azaleas. Rhododendron subgenus Anthodendron.—Arnold Arboretum, Publ. no. 9. vii—219 pp. April, 1921. (The North American species treated by Rehder, pp. 107-170. Includes several from Alabama.)

Wolf, W.

Quercus Bernardiensis sp. nov.—Torreya 18:161-162. 1918.

(From Cullman County, Ala. The author later decided that it was only a hybrid between *Q. montana* and *Q. stellata*.)

PRINCIPLES OF CLASSIFICATION.

Before writing about plants at all it is necessary to give them names; and as it is obviously impossible to have a different name for every individual plant (as we have for human beings), it long ago became customary to use the same name for all individuals which appear essentially alike. Although no two trees are exactly alike (as if cast in the same mold), there is not an infinite variety, as there appears to be among clouds, pebbles on the seashore, etc. Generally speaking, all trees (and other organisms) are grouped into categories which we call species, and all the individuals of the same species resemble each other more than they do those in any other species (after making allowance for different stages of growth, abnormalities, etc.) Within a species there are sometimes minor groups called varieties or forms; and the species are assembled for convenience into larger groups which we call genera, the genera into families, the families into orders, etc. For example, the red oaks and white oaks belong to the same genus, the oaks and chestnuts to the same family, and so on.

Before the principles of taxonomy were well understood, it was a common belief that all individuals of the same species were descended from similar ancestors, and that all species were created simultaneously at the beginning of time. According to this view there could be no relationship between different species, and genera, families, etc., were merely arbitrary groups. It is much more logical, however, to assume that the degree of resemblance indicates the degree of relationship, though direct proof is difficult if not impossible. Whether this is true or not, it is no longer possible to maintain that species are fixed and definite. They are simply categories, or pigeonholes, established for convenience, and no two authorities agree exactly on the classification of a large number of organisms, either as to species or genera.

As the sum of scientific knowledge about the vegetable kingdom increases from day to day, and is recorded in print, it is inevitable that more and more differences between plants previously thought alike should be discovered, and the number of recognized genera, species, varieties, etc. increased. Not only are unsuspected differences of long standing continually brought to light, but the plants themselves may change from one generation to another

almost under our eyes. This is easily demonstrated in the case of cultivated plants, and it is undoubtedly taking place in wild plants, (as shown by fossil remains), though much more slowly.

When what was universally regarded as a single species with pretty definite characters is divided into two or more, the change is often resented by botanists who are not taxonomists, and still more by persons who are not botanists but have to deal with the plants in question in one way or another (e.g., lumbermen and farmers), for it requires readjusting ideas and learning new names. But it would be absurd to say that no more changes of this sort should be tolerated hereafter, for we cannot afford to stop in our tracks and shut our eyes to new discoveries. At the same time the process of splitting species seems to have already been carried beyond all reasonable limits in some groups of plants by specialists who make that their chief occupation, and would be out of employment and soon forgotten if they did not occasionally break into print that way. Fortunately—one might say—the number of persons thus engaged is smaller in proportion to the total number of botanists now than it was ageneration or two ago,* and the splitting process has not been carried as far with trees and shrubs—except in a few genera—as it has with ferns and grasses, or with birds and mammals in the animal kingdom.

A certain amount of this sort of work is necessary, or at least desirable; and newly discovered differences which may seem at first to be slight and unimportant may turn out to be very significant. To take a hypothetical example, it might be found that all the specimens of a certain shrub east of a certain meridian yielded poisonous honey, while those farther west, separated by a few hundred miles, perhaps, and distinguishable at sight only by blooming a couple of weeks earlier, or having a few more stamens in the flowers, might have no such properties. Or we may take some more specific cases. A century ago it was commonly believed that our pines which yield turpentine in large quantities were all one species, and they are still so treated by some geologists and soil surveyors; and our cypresses likewise. But it is now well known that the slash pine prefers wetter soils than the long-leaf, and has different bark, leaves and cones, produces seed oftener,

*See A. S. Hitchcock, Science 11.67:431-432. April 27, 1928.

etc. Likewise our river and pond cypresses differ in their knees, bark, leaves, power of resistance to fire, relation to seasonal fluctuation of water, and especially in geographical distribution; and to call them all one species, (as some "authorities" who have gone to extremes in splitting other genera have done until quite recently) would be to shut our eyes to some very obvious and significant facts.

In this catalogue a rather conservative (and pragmatic) course with regard to species and genera has been followed, for it seems more desirable to spare the 'lay" reader mental exertion and at the same time to keep the expense of printing, storage and mailing within reasonable limits than to list as many species as possible merely in order to make Alabama's list longer than that for some other state. In some of our genera of woody plants the species have lately been so finely divided by specialists that only an expert can distinguish them, and then perhaps only by having leaves, flowers and fruit taken from the same tree at different seasons. (See remarks under *Juniperus, Crataegus* and *Tilia* in the catalogue).

NOMENCLATURE.

Another question closely connected with classification, but not quite the same, is nomenclature. Every plant that is known to scientists has a scientific or technical name, which is usually Latin in form if not in derivation. These are more or less objectionable to the layman, but are necessary for the sake of definiteness. Many plants are so small or rare or unimportant that persons other than botanists have never had occasion to give them names (as is true also of the vast majority of shells and insects); and what is worse, quite a number of plants which are obviously and unmistakably different go by the same common name in different parts of the country or even in the same region, which would cause confusion as if they did not have different scientific names. (The same scientific name has indeed often been given to different plants through oversight, but such mistakes are always rectified as soon as possible.) For example, right here in Alabama we have two short-leaf pines, two cypresses, several red oaks and water oaks, three or four bays, two tytys, two black gums, etc.

When a genus or species is divided of course a new name has to be given to one of the components. The name of a plant may also be changed without a change in classification, on account of a new interpretation of an old description, or something of the sort, and this has caused a great deal of annoyance in recent years. Half a century ago plant names were determined largely by usage and authority, like ordinary language; but under this system the original describer of a plant had no assurance that the name he gave it would not be displaced by a later one coined by some more or less eminent "authority." About forty years ago a movement began to establish nomenclature on a permanent basis, by giving the earliest generic or specific name precedence over all others, unless there was some very good reason for doing otherwise, such as the name itself being preoccupied. That resulted in the immediate discarding of innumerable names which had long been in use; but the reformers tried to assure the multitude of objectors that everything would be straightened out in a few years, and the revised names would soon become as familiar as the displaced ones. This hope has not been fully realized, however, on account of the frequent discovery of old descriptions in obscure places, corrections of disputed dates of publication, differences of opinion in interpreting inadequate descriptions, etc., besides the changes directly and indirectly due to changes of classification. The rules have been revised at several international botanical congresses, but complete agreement has not yet been reached. For example, one faction seeks to retain by special enactment a long list of generic names which were in use practically throughout the 19th century, while others want to follow rigid rules and make no exceptions.

As far as nomenclature itself is concerned, this catalogue follows pretty closely the recent works of Dr. John K. Small, who has written several floras of the southeastern states and parts thereof. But a more conservative attitude toward genera and species necessitates the use of names different from those in his books in some cases. However, where different names are used in different books, both are given here, to make it as convenient as possible for the reader. In dealing with trees the 1922 edition of Sargent's Manual of the Trees of North America and the 1927 edition of Sudworth's Check List of the Forest Trees of the United States have been followed as far as possible.

DEFINITION OF TREE, SHRUB, ETC.

In addition to the specific variations already mentioned, plants also vary in size from the largest trees to organisms invisible to the naked eye. In regions colder, drier or hotter than ours it is often difficult to draw the line between trees, shrubs and herbs; but in Alabama the problem is relatively simple. However, it is desirable to state just what is meant by these terms.

Trees can be conveniently divided on the basis of size into two classes, large and small. The former when mature nearly always reach up to the top of the forest in which they grow, and have trunks large enough so that an ordinary board, say a foot wide and twelve feet long, can be sawn from them. (Each human generation, however, sees the average size of trees successively smaller, on account of the continual cutting of the larger specimens by lumbermen, and a tree which never exceeds a foot or two in diameter might have been called a small tree by our grandfathers.)

A small tree generally grows in the shade of other trees (unless it is a species that thrives best in sunlight, like the willow), and is not large enough for lumber, but it should be large enough to make a fence-post, and have its lowest limbs far enough from the ground so that one can walk under them without stooping. The trunk is usually single and erect, but not necessarily so. A most typical small tree is the dogwood. Of course either a large or a small tree when young may look like a shrub; but a person seeing a totally unfamiliar tree in the juvenile stage can usually recognize it as such by its erect habit, few branches, absence of flowers or fruit, and the resemblance of its foliage to that of some mature trees near by. There are indeed some species of trees which vary in size all the way from shrub to tree, and in unfavorable soils or climate may produce flowers and fruit when only a few feet high. Examples of this in Alabama are the sassafras and white bay.

A shrub generally has several stems from the same root, or a single crooked or leaning stem, not large enough for a fence-post, and seldom more than three inches in diameter.* Shrubs are as a

*Typical large shrubs, which sometimes have stems several inches in diameter, but branch too close to the ground to be called trees, are *Alnus*, *Hamamelis* and *Kalmia*.

rule most abundant in poorer soils; and they usually grow slowly or are much shorter-lived than trees. It is sometimes convenient to distinguish between large shrubs, taller than a man, like the alder, and small ones waist-high or less. This distinction is not important in Alabama, but it seems to have a real significance in higher latitudes. For example, in northern Michigan, where the ground is covered with two or three feet of snow most of the winter, many of the small shrubs are evergreen, the snow blanket protecting their leaves from freezing in zero weather; while those tall enough to show above the snow are all deciduous.

A shrub is ordinarily distinguished from an herb by having woody stems which do not die down to the ground in winter; but there are some intermediate and anomalous conditions. For example, our three palms all have stems which are either under the ground or elevated only a little above it; but they have large stiff fan-like evergreen leaves, which offer about the same resistance to any one passing through the woods as a shrub of the same height would, and as much concealment for animals, and they are here classed as shrubs. All the cacti have perennial stems above the ground, and some of those in the deserts of the Southwest are large enough to be called trees; but ours are so low and of such soft texture that they are classed with the herbs. A few creeping plants, like the *Mitchella,* have evergreen leaves and perennial stems above the ground, but they are not woody enough to be classed as shrubs. (In colder climates there are many low evergreens of that nature, sometimes called undershrubs.) Some of our species of *Yucca* (all evergreen) have stems several feet tall, while one has its stem almost entirely underground, but they are all called shrubs for the sake of completeness, and also on account of their analogy to the palms.

Many plants which are only weeds with us, in the tropics where there is no frost to cut them back continue to put out new leaves from more or less woody stems throughout the year, and thus might be called shrubs there. But that class is hardly represented in Alabama, except by the introduced *Daubentonia,* which might be called either a large woody herb or a weak short-lived shrub.

Woody vines are fairly distinct in our climate, though there are a few species which are only occasionally or doubtfully woody, like *Cebatha,* and a few which sometimes stand up fairly straight and sometimes lean or climb on other shrubs, like *Sageretia* and some of the roses. Nearly all have very light and porous stems, which enable some of them to climb tall trees and attain a diameter of two or three inches without putting an undue strain on the tree. It happens that nearly all of them grow in places which are pretty well protected from fire, such as steep bluffs, hammocks and swamps.

METHOD OF TREATMENT.

In the following catalogue all the trees, shrubs and vines, native and introduced, are put in a single list, and arranged in very nearly the same order as in Mohr's Plant Life, Small's Flora, Sudworth's Check List, etc. (the so-called Eichler or Engler & Prantl system, adopted about forty years ago), beginning with the most primitive types and ending with those which are thought to be the most highly specialized. It should be understood, however, that even if we had all the facts about the ancestry of our plants, their true relationship can never be shown in a linear sequence, any more than the counties of the state can be listed in a single column without separating some that are adjacent. A two-dimensional arrangement would be more logical, and three perhaps still better.

After the name of each family is a brief statement of the number of known species and their general distribution and economic properties. This is compiled from various sources, and is included here because most botanical books (including Mohr's Plant Life) do not give that sort of information.

The treatment of each species begins with its technical name (with synonyms if the name has been changed within a generation or so), and its common name or names, giving preference to those current in Alabama and adjoining states. In our botanical manuals many trees and other plants are given alleged common names which are rarely if ever used by persons not botanists, some of them indeed arbitrarily bestowed by the botanists themselves. Again, the same plant may have different common names in the North and South, and as most of our botanical books are written in the

North, the northern names are apt to be given preference. A striking case of this is one of our shrubs, *Ilex glabra*. It occurs sparingly near the coast from Nova Scotia to New Jersey, and abundantly from Virginia to Louisiana. It seems to be called "inkberry" in the North, but invariably "gallberry" in the South; and only the northern name appears in such works as Small's Flora and the catalogue part of Mohr's Plant Life of Alabama (which was edited in Washington). Thus a name which is used perhaps by a few thousand people is given preference to one used by millions. In the present work every effort is made to distinguish between the bona-fide local names and the exotic or fictitious ones, and to avoid foisting any of the latter on unsuspecting readers; but it cannot be claimed that perfection has been attained in this respect.

After the name of a species follows a brief sketch of some of its salient features, such as size and time of flowering, but no attempt is made to describe any species fully for purposes of identification, for most of our trees at least are already pretty well known to the people who live among them, and descriptions of the less familiar ones can be found in well known botanical works, such as the southern floras of Chapman and Small. It is the function of a state survey to indicate the location and approximate quantity of minerals, water-powers, soils, timber, and other natural resources, but not to compete with the publishers of text-books by telling how to mine coal, make iron, build dams, cultivate different types of soil, or identify minerals, fossils, plants, etc. And indeed to make this catalogue serve as a manual of identification for the use of persons wholly ignorant of botany a glossary of botanical terms would have to be added, as well as keys to the families, genera and species; and that would be too much to expect in a work of this kind.

Photographic illustrations of some of the species are provided, and these may be of some assistance in identification. Unfortunately only a few of the species can be thus illustrated, for most trees grow naturally only in rather dense forests, so that we cannot do much more than photograph the trunk. Occasionally such a tree can be found in an old field or on the edge of a clearing, but in the former case it does not have its normal shape, and in the latter it may not stand out sufficiently from its neighbors. And sometimes an opportunity to photograph a fine speci-

men is lost on account of weather conditions or some other difficulty. In a work designed especially for identification purposes it might be desirable to gather twigs of every species, showing leaves and flowers or fruit, and photograph them against a suitable background. That has been done in a few cases, but to do it for 300 species would be a pretty expensive undertaking.

The 66 half-tones (including 11 previously used in Monograph 8) illustrate 33 species of trees and 10 of shrubs, in 22 counties. Those taken by other persons than the writer are properly credited. All are dated, for plants vary considerably in appearance in different seasons and different years. In a few cases two views of the same tree taken at intervals of several years are presented.

Next the principal economic properties are given, as determined by observations in the field in this and other states, and examination of nursery catalogues, dispensatories, government bulletins, tree manuals, etc. This indeed might be classed as text-book matter, and therefore out of place; but the justification for including it here is that some of it is new and original, and even the compiled information is taken from many different sources, and probably less than half of it could be found in any one existing work. Even yet it is doubtless far from complete.

Finally the usual habitat of the species is given, and its known distribution within the state.* The distribution is given in detail by regions, except in the case of some of the commonest and rarest species, and sometimes with percentages of abundance. The regions are numbered to correspond with the first map, as explained in the next chapter.

For some of the species there are distribution maps, made by several different methods, but all on the same base as the regional map. The ranges of species which are very abundant in some regions and less so in others are indicated by dots varying in density. These dots do not necessarily indicate known localities, but are merely a rough way of indicating relative abundance. Where a species is fairly common in suitable habitats in rather definite areas, and apparently absent from others, oblique shading is used.

*The type-locality and total range would also be of interest to some readers, but those points are covered pretty well in Mohr's Plant Life of Alabama, and very little could be added now to his information about them.

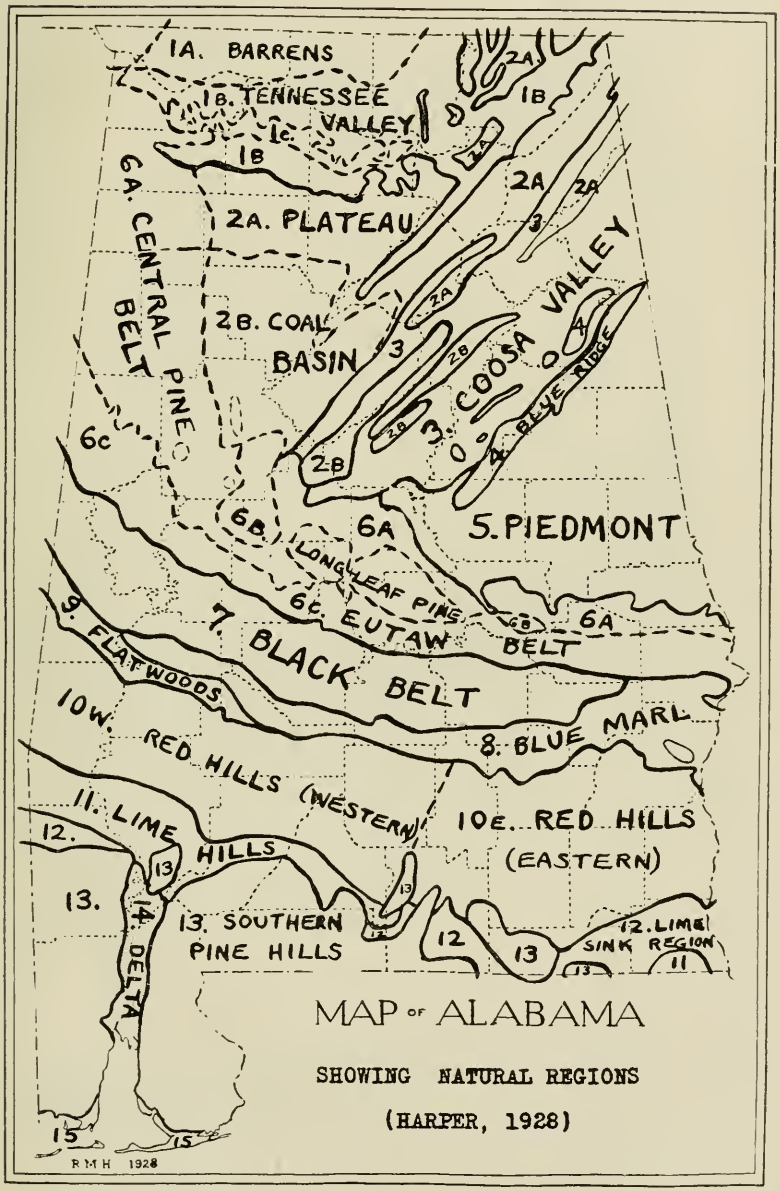
Where the northern or southern boundary of a range is fairly definite, and the species extends beyond the limits of the state in other directions ,a line is used; and this is especially suitable when two or more species are put on the same map. The distribution of some species which occur only along streams is shown in solid black. Two or more related species are sometimes put on the same map, either by the same method or by different methods.

The majority of our trees and shrubs are either so generally distributed over the state that a range map for them would not mean anything (unless we had such detailed information about them that their relative abundance could be indicated), or else known from so few localities that a map would have no advantage over a statement about them in the text. The 18 maps published herewith show data for 18 species of trees (large or small) and 9 of shrubs.

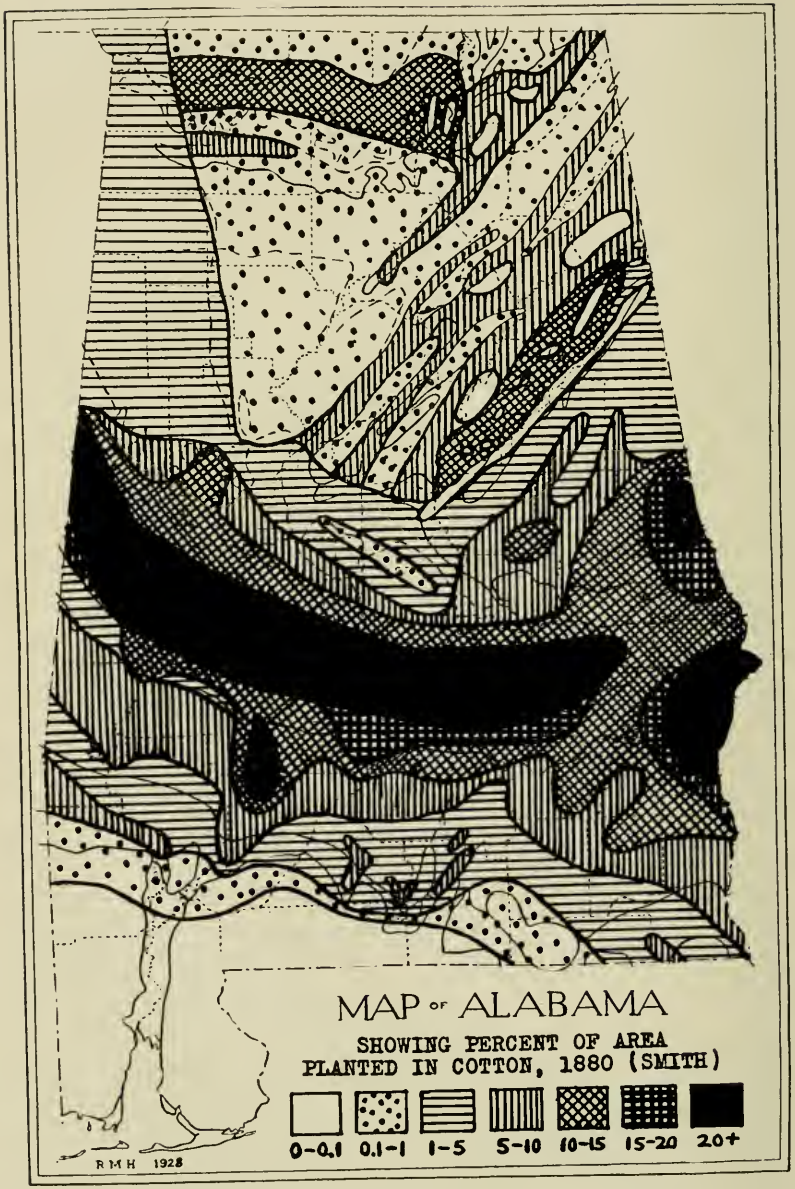
NATURAL REGIONS, SOIL AND CLIMATE.

The state can be divided for convenience into 15 natural regions, each differing from adjoining ones in soil or topography (though the boundaries may not be as sharp as they have to be shown on the map), and some of them have subdivisions, making 21 divisions in all. The boundaries of the major divisions are indicated by continuous lines, and of the subdivisions by dotted lines. The names of the regions are given on the first map, but it has not been thought necessary to include descriptions here, for they have been pretty fully described in Monograph 8 (Economic Botany of Alabama, Part 1, 1923) or in Special Report 11 (Resources of Southern Alabama, 1920). But as the local distribution of species depends largely if not mostly on soil and climate, some maps illustrating these factors are here presented.

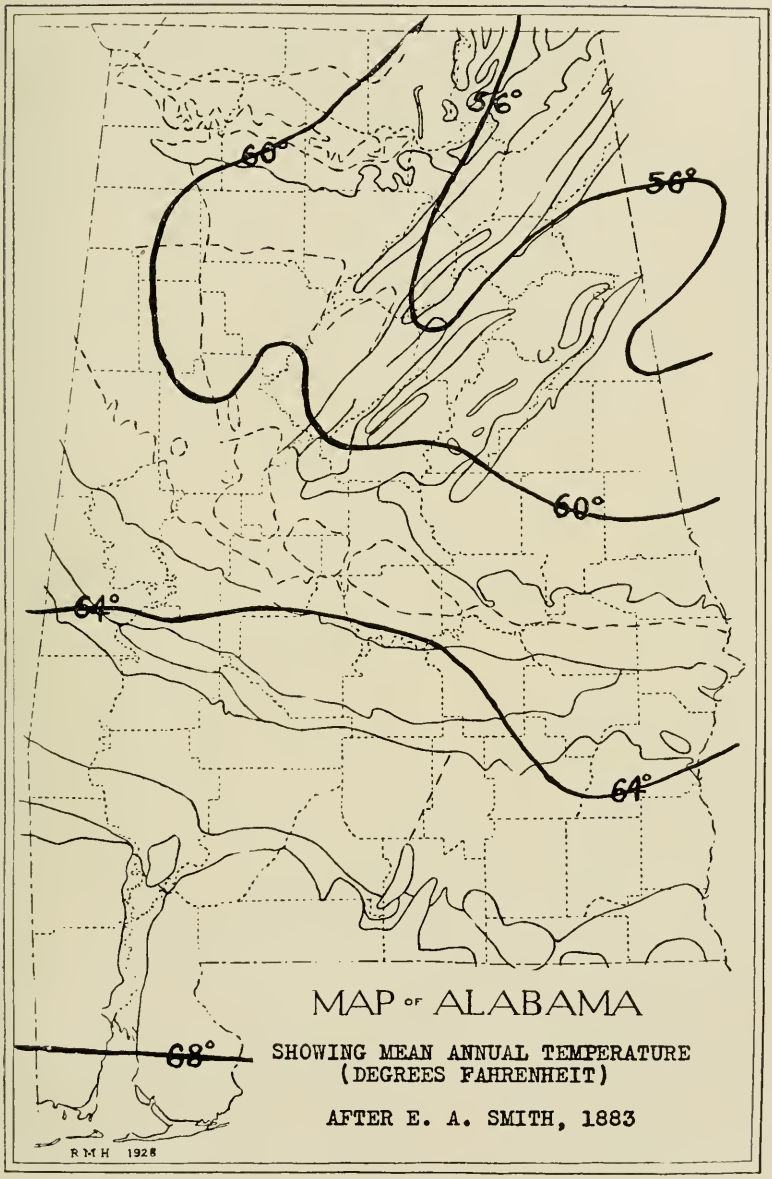
The first (Map 2) may be called a soil fertility map. It is copied as closely as possible from one by Dr. Eugene A. Smith, published in his "Report of Progress" for 1881-2 and in the 6th volume of the Tenth U. S. Census (1884), which shows for all parts of the state the percent of area which was planted in cotton in 1880. As cotton was then (as now) the state's most valuable crop, and the use of commercial fertilizers was then in its infancy, the distribution of cotton was pretty closely correlated with the natural



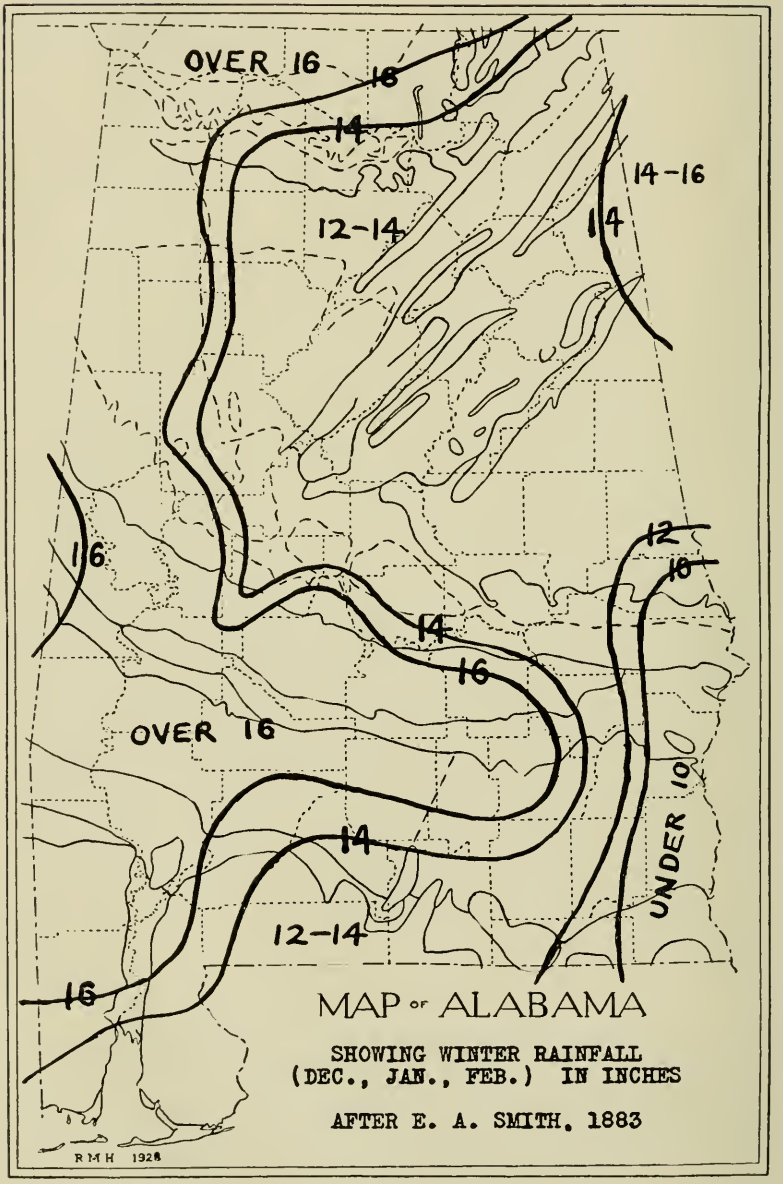
Map 1. Shows the natural regions referred to throughout the text. Those whose names are omitted or abbreviated for lack of space are as follows: 1C. Little Mountain (Hartselle sandstone). 2B. Warrior, Cahaba and Coosa coal fields. 6A. Central shortleaf pine belt. 6B. Central longleaf pine hills. 9. Post-oak flatwoods. 14. Mobile delta. 15. Coast strip.



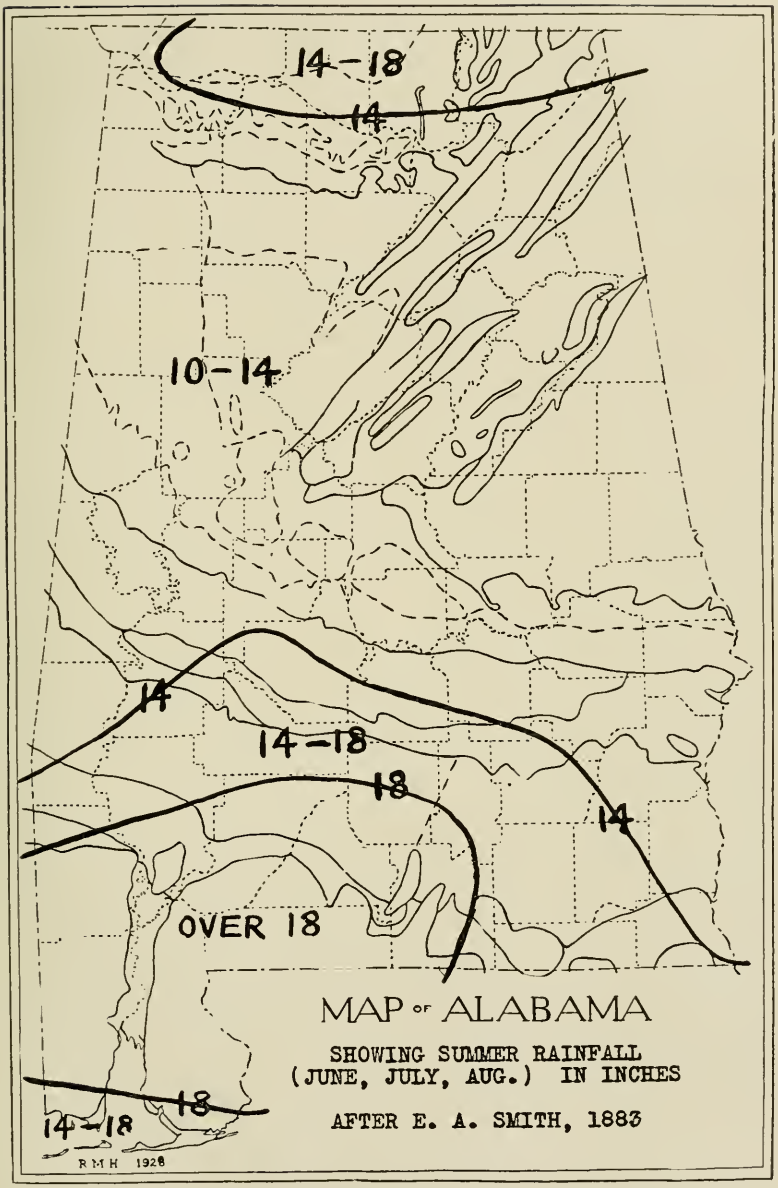
Map 2. Soil fertility, indicated by percentage of total area devoted to cotton in 1880. After Dr. Eugene A. Smith.



Map 3. Annual isotherms, showing average temperature throughout the state. After Dr. Eugene A. Smith.



Map 4. Winter rainfall throughout the state. After Dr. Eugene A. Smith.



Map 5. Summer rainfall throughout the state. After Dr. Eugene A. Smith.

fertility of the soil.* Although the map is generalized and not absolutely accurate, it would be difficult to improve on it without mapping the location of every cotton field, and even that would not mean much at present, since the use of fertilizers has extended the cotton area in the poorer regions and the boll weevil has reduced it in the black belt.

This map shows some striking correlations with the regional map, and with the distribution of many trees and shrubs, as can be seen by comparing it with the distribution maps of *Pinus palustris, Illicium, Cyrilla, Ilex glabra,* and *Osmanthus.* Similar correlations are mentioned at several places in the text.

The three climatic maps are taken from Dr. Smith's report for 1881-2, which deals with the agricultural features of the state. More accurate ones could be constructed by taking advantage of the weather records of the last four or five decades, but these illustrate the general tendencies remarkably well considering their age, and as the publication in which they originally appeared has long been out of print, it seems desirable to perpetuate them in this way.

The map showing average annual temperature needs little comment, except to note that temperature is probably a limiting factor in the case of many species confined to the extreme north or south of the state. Details for several weather stations can be found in Monograph 8 (page 188).

The two seasonal precipitation maps are rather significant. They show the total amount of rain falling in the three winter months (December to February) and in the three summer months (June to August). The ratio of winter or summer to annual precipitation might be better, as suggested in Monograph 8 (pp. 19, 24),† but it is very interesting to note that the most fertile regions have the most rain in winter, while the principal long-leaf pine region has the heaviest summer rain in the western part, and the least winter rain in the eastern part.

---

*One important exception to the correlation between cotton and soil fertility is the Mobile delta, which has very fertile soil, but is very little cultivated on account of being subject to inundation.

†See also Science II. 48:208-211. Aug. 30, 1918.

SYSTEMATIC CATALOGUE.

CONIFERAE (OR PINACEAE). Pine Family.

Includes about 33 genera and 250 species, nearly all trees, widely distributed over the world, and furnishing most of the lumber used in temperate regions, and various resinous products Many are cultivated for ornament.

PINUS, L. The Pines.

Pinus palustris, Mill. (*P. lutea*, Walt.; *P. australis*, Mx.)
(Map 6 and Figs. 1-3) Long-leaf pine.

A large tree, with the longest leaves and largest cones of any pine in eastern North America. The largest specimens on record were about 40 inches in diameter and 100 feet tall; but at the present time it is exceptional for one to escape the lumberman's axe long enough to attain a diameter of two feet and a height of 75 feet. It blooms in March and April and ripens its cones in about a year and a half, but produces good seed only about once in four or five years.

This species probably has more uses than any other tree in North America, if not in the whole world; and as it was probably once the most abundant tree in the United States, the exploitation of its products has furnished the principal source of income for millions of people at one time or another. Its lumber and naval stores have been exported to all parts of the civilized world, over a million dollars' worth in a year sometimes going out from the port of Mobile alone.

Of its many economic properties only a few need to be mentioned here. It does not thrive in cultivation, but is sometimes left standing for ornament when a forest of it is converted into a park or something of the sort. The living tree exhales an aroma which is claimed to be beneficial for persons with weak lungs. Its wood is the strongest, heaviest, and most durable of all North American pines (with the possible exception of its near relative, to be mentioned next). Whole trunks are used for piles, foot-logs, and sometimes (after being creosoted) for poles to carry electric wires. Long dressed pieces make bridge timbers, columns, masts, spars,

FIG. 1. Virgin forest of long-leaf pine about ten miles east of Fairhope, Baldwin County. Photographed by Dr. E. A. Smith and R. S. Hodges, August 13, 1902. These trees were doubtless cut long ago, and it may never be possible to take such a picture in Alabama again.

FIG. 2. Looking vertically upward in virgin forest of long-leaf pine in lime-sink region about two miles northwest of McRae, Covington County, showing the sparse foliage, which lets plenty of sunlight through to the forest floor. June 10, 1919.

sills, beams, joists and rafters. Smaller rough, hewed or split pieces make crossties, fence rails and posts, mine props, log cabins, cribs, stick chimneys, staves of rosin barrels, and home-made palings and shingles. Blocks of it about the size of an ordinary brick, impregnated with creosote—another product of the same species—have been used extensively in the last twenty years or so for street paving, at least as far north as New York.

Sawed lumber goes into fences, weatherboards, shingles, flooring, wainscoting, doors, sash and blinds, cars, cotton gins, and countless other articles. The sawdust is used for packing ice, etc., as well as for fuel in the mills which produce it.

Young shoots two or three feet high have been shipped north from Evergreen and elsewhere for winter decorations. Leafy twigs of this and other pines are used for stopping the openings in the bottoms of coal cars when loaded at some of the mines in the Birmingham district. The dead leaves ("pine straw") are used for mulching and bedding, and occasionally for making fancy baskets. They have been used a good deal for surfacing sandy roads.

FIG. 3. Long-leaf pine turpentined by the old "box" method, a few miles north of Bayou la Batre, Mobile County, before cups and gutters came into use. Photographed by Dr. Eugene A. Smith and R. S. Hodges, July 31, 1902.

especially in Florida before the days of automobiles and asphalt roads. A fiber extracted from them by a chemical process is known as pine wool, and is said to have about the same properties as excelsior.

The resinous nature of the wood adapts it especially for fuel, torches, and kindling ("lightwood"). It constitutes the principal domestic fuel in all the regions where it abounds, and is used a great deal by electric light and waterworks plants in the smaller cities in the same regions. It has not been many years since passenger trains in southern Alabama and adjoining states were drawn by wood-burning locomotives, and many if not most log trains still are. Long-leaf pine wood has also been used for charcoal, though

it perhaps has no advantage over many other species for that purpose. Charcoal burning, to furnish fuel for the cooks of Mobile and New Orleans, was a considerable industry in Mobile County and adjacent Mississippi two or three generations ago, when there were few railroads, and the pines remote from navigable waters were worth nothing for timber, for it would have cost too much to haul them out. When converted into charcoal, however, the product was much lighter and also more valuable, so that the cost of transportation was not such a limiting factor.

The gum furnishes the so-called "naval stores," i.e., turpentine, rosin, tar, creosote, lampblack, etc., which are important articles of commerce. It is usually taken from the living tree by chipping off the bark and a thin layer of sapwood every week or so, going a few inches higher every year; but similar products are also obtained by distilling stumps and other dead heartwood. An oil can be extracted from the leaves too by a process of distillation.

The seeds and seedlings are eaten by hogs, a fact which tends to retard the reproduction of the tree in free-range territory.

An exhaustive discussion of the properties and uses of this and several other of our pines can be found in Dr. Mohr's bulletin on the Timber pines of the southern states (Mohr 18 in bibliography). For additional information see Betts, Fernow, Hall & Maxwell 2, Harper 11, 20, Harris & Maxwell, Hill, Mattoon 4, Mohr 5, Schwarz, Surface & Cooper.

Distribution. The long-leaf pine grows usually in poor soils, either sandy or rocky, and rather dry, but not quite the poorest. There are occasional exceptions, however. In Talladega and perhaps other counties it can be found in rather rich-looking red clay soils weathered from limestone, and in the Tallapoosa River and some of its tributaries it grows on rocks out in the stream (or did before most of our shoals were flooded for power purposes). It seems to thrive best in regions which have considerable rain in summer, a condition best realized in the southern parts of the state. It withstands fire better than almost any other tree we have, and occasional fires seem to be essential to its development. For it seems to germinate only on bare soil, and if there was no more fire the soil would become covered with pine straw and humus, and there would apparently be no more pine reproduction, and hardwood trees of various kinds would take its place, as they have

Map 6. Known distribution and approximate relative abundance (original rather than present) of *Pinus palustris*, indicated by dots.

already done in many hammocks, etc. It is almost impossible to find a long-leaf pine forest which does not show the marks of recent fires. Some people are inclined to regard such fires as mere accidents, which are much more frequent now than they were in pre-historic times; but the multiplication of fields, roads, etc., cuts the forests up into small patches, and thus restricts the area over which a fire started by lightning or any other ntaural cause can spread; and the frequency of fire at any one point in the pine woods may be no greater now than it was a thousand years ago. (This matter is more fully discussed in Monograph 8, and in several vegetation studies by the writer in the annual reports of the Florida Geological Survey. See also Andrews 1 in bibliography.)

This was originally probably the most abundant tree in Alabama, as well as in several other southeastern states; but it has been so thoroughly exploited by lumbermen in all accessible localities that the present stand may not be over one-tenth of the original. It occurs in every region in the state except the Barrens, Tennessee Valley, Mobile delta and perhaps the Coast strip. Its distribution and relative abundance are shown pretty well on the accompanying dot map, but some details by regions deserve to be given also, as follows.

2A. Winston, Blount, and Etowah Counties, rather rare.

2B. Abundant around South Lowell, Walker County, two decades and more ago; but a logging railroad has invaded that area since the picture in Monograph 8 (fig. 14) was taken, and has lately been discontinued, which probably means that all the pine worth cutting is gone. Scattered in Jefferson and Tuscaloosa Counties; worked for turpentine in the latter about 17 years ago, and soon afterward ruthlessly exploited by sawmills. Common in the Cahaba coal field, less so in the Coosa.

3. Frequent on the poorer soils in nearly every county, especially chert ridges. Worked for turpentine in Talladega County a decade or so ago, and perhaps later.

4. Common on dry sunny slopes, up to 1900 and perhaps even 2000 feet above sea-level (as nearly as can be determined by topographic maps). Apparently not turpentined in the mountains yet, on account of its scattered growth and the rough topography. A generation ago there was a large sawmill at Hollins, and many small mills have nibbled at the pine in this region since.

5. Common, except in an area of a few hundred square miles around LaFayette, where the soil appears to be a little too rich for it (and also for *Magnolia glauca*, which see).* A little too scattered to be turpentined profitably, and not being cut for lumber much at present.

6A. Common from Tuscaloosa County southeastward, but never very abundant. I have seen a few specimens in the southeastern part of Fayette County.†

---

*Compare with map 2 herein.

†See Torreya 23:50-51. 1923.

6B. The dominant tree, originally constituting perhaps half the forest, but now reduced by logging operations, and clearing the uplands, to 25% or less. There were several large sawmills in this region 15 years ago, but apparently only a few small portable mills now remain. Formerly turpentined in Tuscaloosa and Autauga Counties, but that too seems to be almost at an end. There seems to be very little young growth now.

6C. Rather scarce, and only in eastern half.

7. Not typical of the black belt, but grows in sandy soils in Dallas County, and also on some clayey soils apparently derived from the Selma chalk, a few miles southwest of Carlowville.

8. Scattered, from Pike County eastward. The locality near Carlowville, just mentioned, may also belong to this region.

9. Scattered, but between Livingston and York it was abundant enough to be sawn for lumber about twenty years ago.

10 W. On the Buhrstone mountains‡ and other poor ridges, and also in some rather flat low areas, particularly in Butler County. Rarest in Wilcox (the most fertile county south of the black belt) and apparently commonest in Butler and Choctaw, where a few large mills are still cutting it.

10 E. Originally common on dry uplands, but now greatly reduced by the clearing of these uplands for farming purposes. Rare or absent in a considerable area in Pike County (and there are similar spots in the same region in Southwest Georgia).

11. Scattered on the poorer soils.

12. The dominant tree, originally constituting about half the forest, but now greatly reduced by farming and lumbering. As late as 1919 there were some magnificent virgin forests in southern Covington County, within ten miles of the largest sawmill in the state (which is managing its holdings scientifically), and some of that may be there yet.

13. Originally ubiquitous except in swamps, etc., and constituting about three-fourths of the forest, but now reduced by lumbering and farming to little more than sapling thickets. It reproduces itself remarkably well in this region, though, and will make another good crop of timber if ever given a chance.

Pinus Elliottii, Engelm. (Formerly confused with *P. Cubensis* Grisch.) SLASH PINE.

(Map 7, Fig. 4)

A tree similar in many ways to the preceding (and often confused with it by geologists and soil mappers), but with a different bark (almost impossible to describe), usually a straighter trunk, shorter leaves, and smaller and smoother cones. It blooms about a month earlier than the long-leaf pine, and makes plenty of seed every year. It averages a little smaller than its relative, but I have seen a specimen 40 inches in diameter in the southeastern portion of Covington County. Its economic properties are much the same as those of long-leaf, and many of the statements made about the former will apply to this also.

---

‡See Bull. Torrey Bot. Club 37:124. 1910.

FIG. 4. Slash pine in damp sandy flats with evergreen bushy undergrowth, about one-half mile south of Orange Beach P. O., Baldwin County, June 13, 1912.

References:—Mattoon 3, Mohr 18.

Grows normally in shallow ponds, branch-swamps, etc., but occasionally in old fields and cut-over lands with comparatively dry soil, a circumstance which led some foresters a generation ago to believe that it was gradually replacing the long-leaf pine. Throughout its range it is confined to regions with plenty of rain in summer, which leaches out the fertility of the soil. Its inland limit is pretty sharply defined, all the way from South Carolina to Louisiana. (See map.)

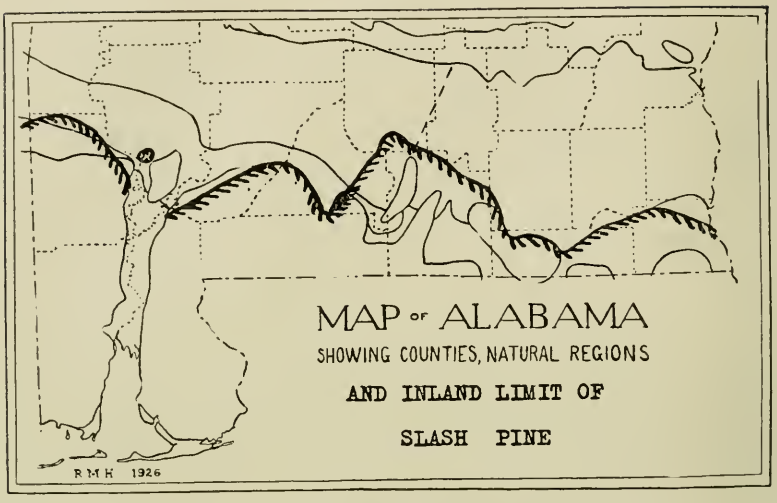
10. Extreme southern part of Butler County, and neighboring parts of Conecuh and Covington.

12. Common in ponds and branches.

13. Common along branches, etc., and often in clearings.

15. Common or locally abundant in damp sandy flats.

Some of the slash pines along the coast may represent *Pinus Caribaea* Morelet, which is abundant in southern Florida—and seems quite distinct there—and apparently follows the coast to Georgia and Mississippi. It prefers drier soils than *P. Elliottii* does, and is much less valuable for lumber and naval stores.



Map 7. Inland limit of *Pinus Elliottii*.

Pinus Taeda, L. Short-leaf pine. (Loblolly or old field pine of the books.)

(Figs. 5, 6)

This is the largest of our pines when fully developed, occasionally reaching a diameter of four feet, with the lowest limbs 50 feet from the ground, and a total height of 100 feet or more; but of course few such specimens have escaped the lumbermen. It blooms in March and April, and produces plenty of seed every year.

Its wood is inferior to that of the long-leaf pine in almost every way, but is used very largely for similar purposes where long-leaf is scarce or absent; and its rapid growth adapts it well to silvicultural projects. The wood being lighter and softer than long-leaf, is better adapted for boxes, crates, etc. In New Orleans and doubtless elsewhere it is made into excelsior. It is not very durable, but in recent years has been used a good deal for cross-ties and telegraph poles, after being impregnated with creosote. When it grows in or near long-leaf pine turpentine orchards it is sometimes chipped like the long-leaf, but probably with indifferent results.

FIG. 5. *Pinus Taeda*, about 32 inches in diameter and 60 feet tall, in open grove on east side of University campus. Photographed by Walter B. Jones, June 29, 1928.

FIG. 6. Trunk of *Pinus Taeda*, about 46 inches in diameter, in old flood-plain of Warrior River about two miles south of Tuscaloosa. May 31, 1913.

References:—Ashe 3, Betts, Hall & Maxwell 2, Hopkins, Mohr 18, Sterrett 2.

This species grows in a great variety of soils, including nearly all but the richest and poorest, wettest and driest, and in every region in the state except the Mobile delta, and probably in every county. It is almost the only pine which will grow in places subject to inundation by muddy rivers. A great deal of it now is second growth, and in some of the more fertile regions, such as the Tennessee Valley and black belt, it may be more abundant now than it was originally, having sprung up in many old fields whose soil was impoverished by long cultivation. Its relative abundance in different regions is indicated as follows:

1A. Abundant in northern Limestone County, where it is cut for lumber.

1B. Comparatively rare, and mostly second growth.

1C. Rather common.

2A. Common nearly throughout, except north of the Tennessee River and on the highest elevations south of there. Apparently more abundant eastward than westward.

2B. The most abundant tree.

3. Very common.

4. Ravines and lower slopes of the mountains. Rare or absent above 1500 feet above sea-level.

5. Common throughout, but much of it second growth.

6A. The most abundant tree, but in the northern portion mostly confined to valleys.

6B. Common in valleys.

6C. Very common.

7. On the poorer soils; much of it second growth.

8. Generally distributed; much second growth.

9. Abundant throughout.

10-11. Common, especially in valleys.

12. Mostly near creeks and rivers.

13. Creek bottoms, etc.; not abundant.

15. Common along bay shores, etc., in the richer soils.

Pinus serotina, Mx. BLACK PINE. (Called pond pine in many books, but that name is misleading, and probably not genuine.)

(Figs. 7, 8)

Similar in appearance to *P. Taeda,* except that it has shorter branches, and often many small leafy shoots along the trunk, giving it a shaggy appearance which is very characteristic. The cones are smaller and less prickly, egg-shaped when closed, and they usually hang on for several years, so that there are more of them on the tree at one time than in the case of most of our other pines. Its wood is similar to that of the preceding species, but too rare in Alabama to be of any economic importance. (Dr. Mohr did not know of its occurrence in the state at all.*)

Grows mostly in sour swamps and bogs in long-leaf pine regions, in the coastal plain.

6A. Bogs along Yellow Leaf Creek east of Thorsby, Chilton County.

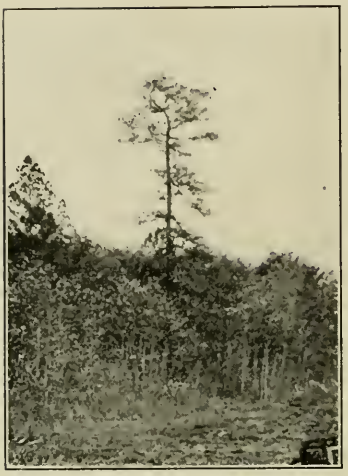
6B or 6C. Swamps along and near Autauga Creek about a mile above and two miles below Booth. (The accompanying illustrations include two pictures of the same tree taken over 21 years apart, showing that it grew very little in the interval.)

10E. Damp sandy flats between Waterford and Daleville, Dale County.

12. Scattered in Dale, Houston, Geneva and Covington Counties.

13. Near Andalusia and Lockhart, Covington County.

*For an account of its discovery in Alabama see Bull. Torrey Bot. Club, 33:524. 1906.



7

8

FIGS. 7, 8. *Pinus serotina.* Two views of same tree, in swamp of Bridge Creek at crossing of M. & O. R. R., Autauga County. April 22, 1906, and June 9, 1927. The tree gained very little in height in 21 years, and was only about two feet in diameter at the latter date.

Pinus echinata, Mill. (*P. mitis,* Mx.)

SHORT-LEAF (OR ROSEMARY) PINE.

(Fig. 9)

A tree sometimes two or three feet in diameter and 75 feet tall, with short leaves and small cones. Blooms about the same time as *P. Taeda,* or possibly a few days later.

The wood of this species is much like that of *P. Taeda* but a little better, and it is cut extensively for lumber in regions where it is common and the long-leaf pine rare or unknown. It also makes very good fuel, like most other pines. Near negro farm-houses a large living tree can often be seen with a great cavity in its side, from which the negroes chop out "lightwood," a little at a time. This species is offered for sale for ornamental purposes in some nurserymen's catalogues, and is said to be hardy as far north as southern New England (which however is not much north of its natural range). Twigs of it are sometimes used to stop cracks in gravel cars, like other pines.

References:—Betts, Hall & Maxwell 2, Hopkins, Mattoon 2, Mohr 18.

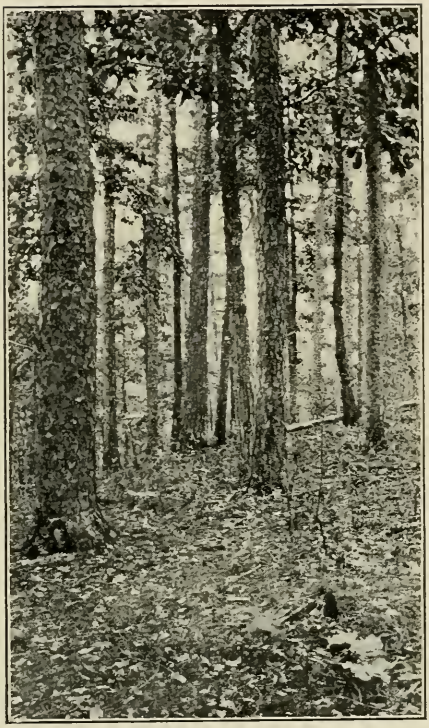


FIG. 9. *Pinus echinata* (the nearest one 20 inches in diameter) in dry woods about six miles east of Tuscaloosa. October 13, 1911.

It is confined to dry soils, but seems to require a moderate amount of iron and alumina, if not potash. Most pines avoid calcareous soils, but this one grows on top of some of the high limestone cliffs on the Tennessee River in Madison and Marshall Counties. It seems to resist fire pretty well, but the woods in which it grows are not burned as often as the long-leaf pine forests. It is common throughout the northern half of Alabama, and gradually disappears southward.

1A. Common in Limestone County, in the driest soils.
1B. Mostly second growth, in the poorest soils; not common.
1C. Common.
2A, 2B. Very common on uplands.
3. Common on dry ridges, in old fields, etc.

4. Common, especially on the tops of ridges, where they are not too rocky.

5. Very common on dry red hills, but a good deal of it is second growth. In Tallapoosa County it seems to be the prevailing pine.

6A. Common in dry woods; some of it second growth.

6B. On hills, but not in the sandiest soils.

6C. Same as 6A.

7. On patches of red loam overlying the Selma chalk, and in old fields.

8. Frequent on dry uplands, especially in old fields.

9. Abundant throughout, and cut by all the sawmills.

10E. Common on uplands.

10W, 11. Dry ridges, often very slender.

12, 13. Rather rare, in richer soils. Extends south to near Hurricane, Baldwin County.

Pinus glabra, Walt. SPRUCE PINE.

(Map 8, Figs. 10, 11)

A handsome tree, remarkable for the smooth bark on those parts of the trunk that are less than 8 or 10 inches in diameter, the soft wood, unarmed cones, and bluish gray foliage. (In all these respects it resembles the northern white pine, but it is not very closely related to that.) It ocasionally attains a diameter of 42 inches and a height of 80 feet, but on the average it is probably no larger than the preceding species. Its leaves and cones are about the same length as those of *P. echinata*. It blooms usually in March.

The wood is the softest and lightest of all the Alabama pines, with the possible exception of *P. clausa* (which is rare in this state). It answers very well for crates and interior finish, and where there is enough of it it is used to some extent for fences, weatherboards, etc., but it is not very durable. It would doubtless make a good ornamental tree, on account of its handsome appearance and its preference for richer soils than most other pines.

References:—Mohr 10, 18.

This species grows mostly in hammocks, ravines, and bottom lands, where fire is rare, and it seldom if ever makes pure stands, as most other conifers do, but is mixed with magnolia, beech,

FIG. 10. *Pinus glabra*, about two feet in diameter and 75 feet tall, in Conecuh River bottoms northwest of Troy, Pike County. December 11, 1905.

sweet gum, and other hardwoods. It is strictly confined to the coastal plain, and scarcely extends north of latitude 33° in any part of its range.

6A (?). One or two small trees a little south of Maplesville, perhaps of recent introduction. Native along a small creek about six miles east of Wetumpka, and along creeks in the northern part of Macon County. Several years ago some pine cones from a peaty stratum in a cut near Mountain Creek, Chilton Co., were referred by Prof. E. W. Berry to this species. If that is correct it must have ranged a little farther north in Pliocene or Pleistocene time than it does now.

FIG. 11. Trunk of *Pinus glabra*, 30 inches in diameter, in creek bottoms about four miles east of Ozark, Dale County, December 12, 1905.

6C. Autauga, Elmore, Macon, and probably Russell County; rather rare.

7. Occasional in creek bottoms, Dallas, Montgomery and Bullock Counties.

8. Common in creek bottoms throughout.

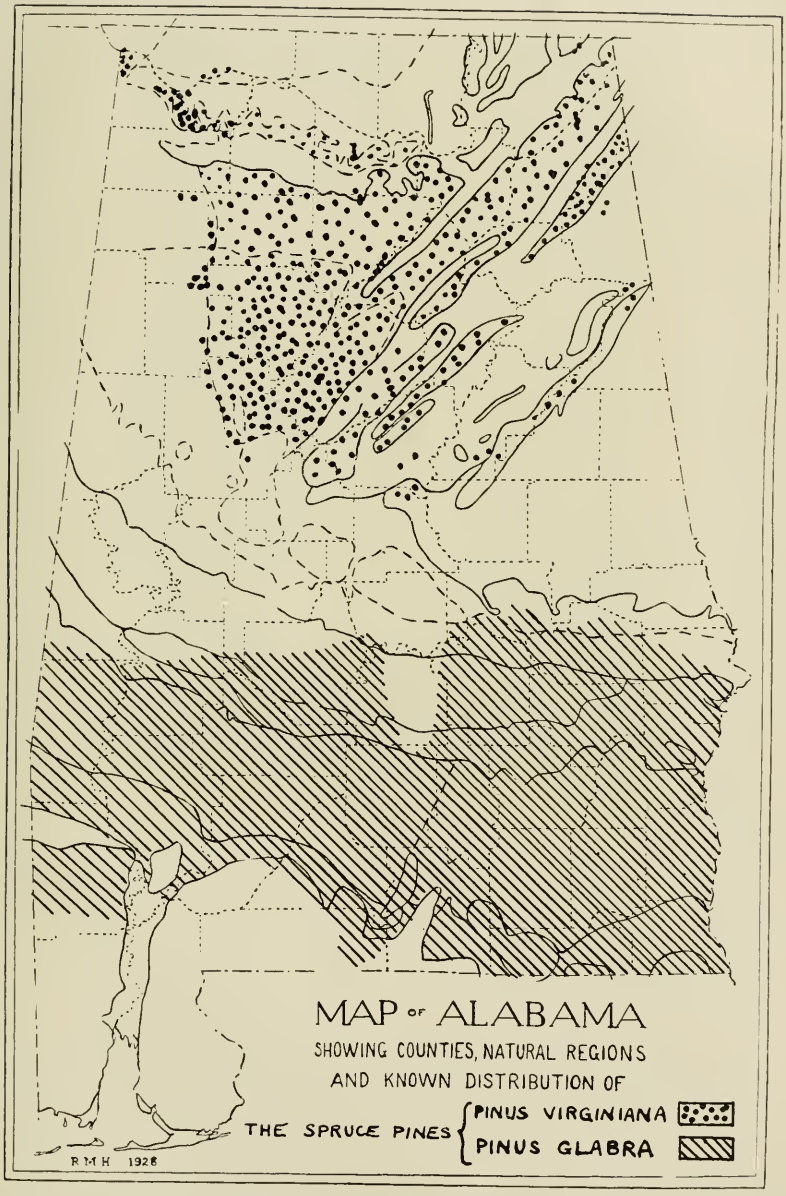
10E. Frequent in creek and river bottoms.

10W. Common in ravines and bottoms, up to the northern edge of Choctaw County and presumably the southwest corner of Sumter.

11. Ravines, bluffs, etc.; common.

12. Hammocks, etc.; not common.

13. Occasional in hammocks in Washington and Escambia Counties. Rare in Mobile and Baldwin.



Map 8. Known distribution of *Pinus Virginiana* and *Pinus glabra*, with relative abundance of the former indicated approximately by dots.

Pinus Virginiana, Mill.(*P. inops*, Ait.) Spruce Pine. Also called bastard, cliff, or nigger pine.)

(Map 8, Fig. 12)

A small to medium-sized scrubby-looking tree, not usually more than a foot in diameter and 40 feet tall, with very short leaves, thin scaly bark, and light soft wood that decays easily.

It is offered for sale by some nurserymen, but is probably not much in demand for ornamental purposes. It is said to have once been used largely for water-pipes and pump-logs in Kentucky (where other pines are scarce). Logs of it are sometimes used for temporary trestle work around mines and furnaces, where there is nothing else more handy for the purpose. It grows in the neighborhood of nearly every coal mine in Alabama, and its twigs, like those of several other pines, are often used to stop crevices in hopper-bottomed cars of coal. It of course makes fuel, like most other trees, but as the fuel value of wood is approximately proportiona to its weight, this species does not rank high in that respect.

In the last 25 years or so it has come to be used a good dea for paper pulp (like the northern spruces, which it somewhat resembles), especially in Maryland and Virginia. In June, 1921, the Birmingham Age-Herald printed an edition on paper made from some of this tree cut in Tuscaloosa County and worked up in some northern paper mill. There is certainly plenty of it in Alabama but most of it is in rather rough and inaccessible places, and whether it can be cut and delivered to a mill in large enough quantities and cheaply enough to compete with the supply in more leve country in Virginia and Maryland and the spruces farther north, remains to be seen.

References:—Harper 13, Sterrett 1, Wells & Rue.

In Alabama it is chiefly confined to steep rocky slopes, cliffs and bluffs, north of the fall line; all of these places being pretty well protected from fire, to which all pines with very short leaves and thin bark seem to be sensitive. It nearly always grows in dense pure stands, like the northern spruces. It occasionally invades old fields, but not as much with us as in the middle states. Its distribution is shown by dots on the map, and may be summed up by regions as follows:

FIG. 12. *Pinus Virginiana*, of various sizes and shapes, on bluffs on left side of Warrior River about ten miles above Tuscaloosa. Walter B. Jones, June 21, 1928.

1A, 1B. On steep slopes and rocky creek banks near Riverton and Florence, also in northeastern Jackson County and near Blount Springs. Some second growth near Leighton, Colbert County.

1C. Colbert County.

2A. Common on cliffs and rocky slopes, especially eastward.

2B. Abundant on steep rocky and shaly bluffs, especially near rivers. Constitutes probably at least 5% of the forest.

3. On rocky hills near the edges of some of the valleys, and also as second growth, but not common.

4. Frequent on sandstone cliffs, etc.

5. Rare, except in the northeastern part of Chilton County, which is not very typical of the Piedmont region.

6A. A few old-field specimens near Thorsby, Chilton County.

6B (?). On a bare rocky knob between Cottondale and Duncanville, Tuscaloosa County; apparently the only place in the coastal plain south of Virginia where it is native.

There are unconfirmed reports (by Prof. Sargent, in a letter) of its occurrence somewhere near Selma; possibly an old field specimen, or some other species mistaken for it in the herbarium.

Pinus clausa (Engelm.) Sarg. (Florida) Spruce pine.

A small tree, much like the preceding (and once regarded as a variety of it), but belonging to warmer climates. The two probably do not grow naturally within 200 miles of each other. Its wood is soft and weak, and seldom used for any purpose, but it would probably do for paper pulp if there was enough of it.

References:—Harper 13, Mohr 11, Wells & Rue.

In Alabama it is confined to stationary dunes of pure white sand on the coast of Baldwin County. It is otherwise known only from Florida, where it is widely distributed, usually on the same kind of soil.

TSUGA, Carriere. The Hemlocks.

Tsuga Canadensis (L.) Carr.
(Eastern) Hemlock, or Spruce pine.

A handsome evergreen tree, with short flat blunt leaves, which make a dense shade. Blooms in spring.

Although too rare to be of any importance in Alabama, this species has many uses elsewhere. It is sometimes cultivated for ornament or hedges in the North (more rarely in the South), and it also makes a pretty good Christmas tree. Sixteen horticultural varieties of it have been named. In the mountains from New York to Georgia, and also as far west as Michigan, its bark is gathered in large quantities for tanning purposes, and the timber remaining then often allowed to rot in the woods. Its wood makes pretty fair lumber, though, something like some of the pines; and its sap is said to have some medicinal properties.

References:—Frothingham, Harper 4, 16, Prentiss.

Grows in cool shaded ravines and gorges, rarely or never visited by fire. In Alabama confined to the coal region, and almost

to the plateau subdivision thereof. Its known distribution by counties is as follows:

Franklin: Near Spruce Pine (named for this tree), on a tributary of Big Bear Creek; and said by residents there to extend about twenty miles down the creek. (See Bull. Torrey Bot. Club 33:524-525. 1906.)

Marion: Along Brush Creek at the great viaduct of the Illinois Central R. R., and doubtless at various other places.

Winston: Along Sipsey River and Clear Creek (Peters, Mohr), and at the Natural Bridge. (See Monog. 8, pp. 49, 136.)

Jackson: In the Pisgah "gulf" near the northwestern edge of Sand Mountain. (Harbison, Biltmore Bot. Stud. 1:154. 1902.)

Jefferson: Along Village Creek about 3 miles southwest of Adamsville. This seems to be its southernmost known station (see Torreya 19:198-199. Oct., 1919) though there is a later unconfirmed report of its occurrence in Tuscaloosa County.

TAXODIUM, Richard. The Cypresses.

Taxodium distichum (L.) Richard. (River) Cypress. (Also called white, yellow, red and black cypress, according to the appearance of the wood.)

(Map 9, Figs. 13, 14)

A large deciduous tree, reaching in this state a diameter of about five feet—above the enlarged base—and a height of 100 or even 120 feet. It grows slowly, and lives for several hundred years, something like its relatives the Sequoias of California, but seems to reach its maximum height in about 100 years, after which it becomes more and more flat-topped, giving it a characteristic appearance by which it can often be recognized at a distance of over a mile. The bark is thin and fibrous, something like that of the cedar. The leaves are commonly arranged in two opposite rows on short feather-like branchlets which fall with the leaves attached, like compound leaves, in late fall. The wood is light and soft in spite of its slow growth, but very durable, probably on account of some chemical properties which resist bacteria. It blooms in February and March, and ripens its seeds in the fall of the same year.

Economically the cypress is a very important tree. Outside of its natural range it is often planted in parks and streets, where it grows very well in ordinary dry soil, and faster than in its native haunts (because it is relieved from the competition of other trees). It is said to be hardy as far north as Massachusetts in this country

FIG. 13. *Taxodium distichum* (with a few specimens of *Nyssa uniflora*, etc.) in swamp of Big Creek, about four miles west of Northport, Tuscaloosa County, March 4, 1913.

and England in the Old World. Several horticultural varieties have been named. Cultivated trees are nearly always narrowly conical in outline, like young trees in nature, probably because few of them are old enough yet to be flat-topped.

On account of its durability the wood is used especially for piles, telegraph poles, crossties, water pipes, tanks, vats, tubs, buckets, freezers, churns, and shingles. Tanks and pipes made of it for use in chemical industries are said to resist the action of acids and alkalies better than almost any other common wood. By the early settlers large cypress logs were carved into boats, troughs, washtubs, and the hollow "knees" used for buckets, flower-vases, and the like. Around New Orleans the palings of many old fences

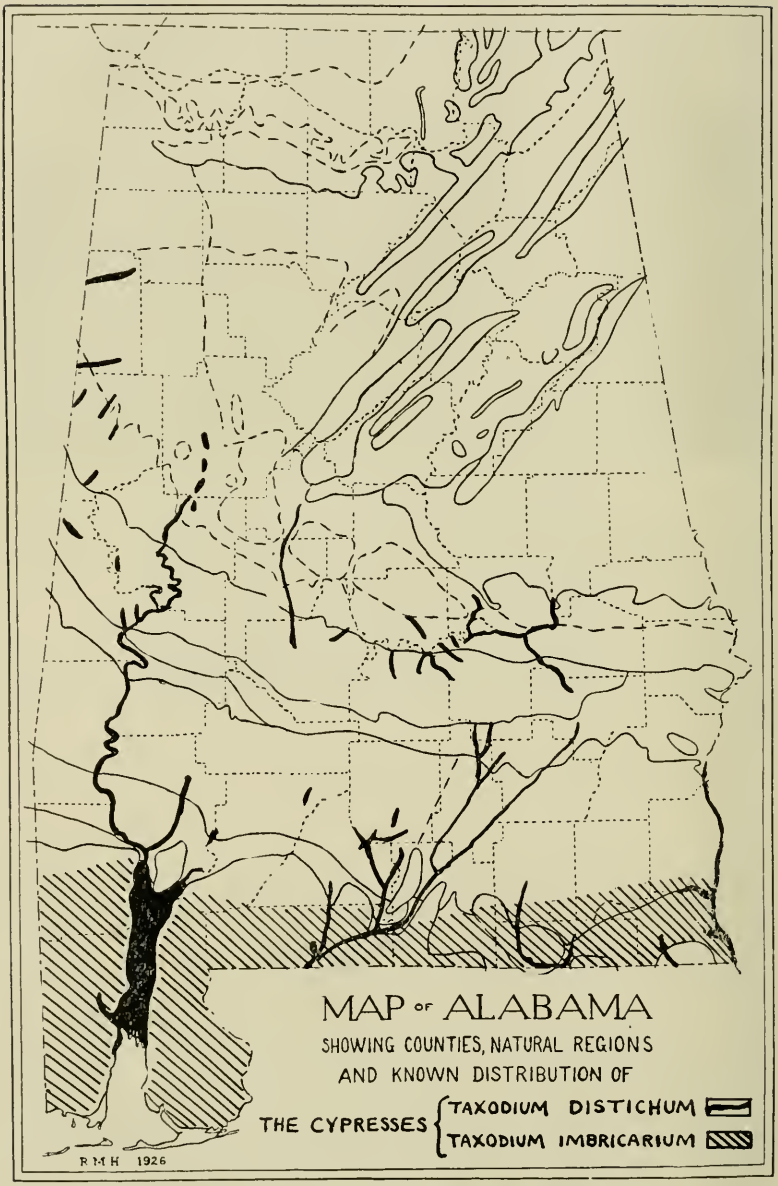
FIG. 14. A few old and many young specimens of *Taxodium distichum* in old flood-plain of Alabama River about a mile northeast of Montgomery. October 26, 1926. The young trees are quite differently shaped from the old ones, and their abundance at this particular place must be due to some sort of human interference, perhaps a generation or two ago.

are made of broad split slabs of this species. Other common uses for cypress wood, when sawed, are for trestles, barrels, interior finish, furniture, doors, sash and blinds, greenhouse frames, gutters, etc.

References: Fernow, Hall & Maxwell 1, Harper 1, 2, Mattoon 1.

This species grows normally in calcareous and alluvial swamps, where the water does not fluctuate more than about twenty feet in the course of a year.* (It is therefore usually absent from the immediate banks of our larger rivers, except near their mouths; and there is much more of it on the Tombigbee River than on the Alabama, probably because the fluctuations of the former were less, even before the building of locks and dams on it two or three decades ago.) Its knees usually grow to the height of average high water, or perhaps to the greatest height at which the water stands for a week (or whatever is their maximum period of endurance) at a time; which seems to be never more than six feet. Fire is rare or unknown in the cypress swamps, but if it came it

*See Torreya, 11:228, 231. 1911; Science, 36:760-761. Nov. 29, 1912.



Map 9. Known distribution of *Taxodium distichum* and *T. ascendens.* (*T. imbricarium*). The locality for the former on Cypress Creek near Florence was inadvertently omitted.

would probably do considerable damage, on account of the tree's thin bark.

Its distribution in Alabama is rather irregular, but as far as present knowledge permits it is shown on the accompanying map by solid black along streams. It is assumed that wherever this species has been observed along any creek it occurs from that point all the way down to its mouth, unless we have information to the contrary. It is confined to the coastal plain, except for extending a little farther inland along the Tennessee, Coosa and Tallapoosa Rivers and some of their tributaries.* On account of being almost confined to the banks and swamps of rivers, it does not constitute a large proportion of the forest of any region except the Mobile delta, which is practically all swamp (and probably most of the original supply there has been cut out). It grows so slowly in the swamps that it does not have much chance to restore itself after logging operations.

Taxodium ascendens Brong. (*T. imbricarium* (Nutt.) Harper.) (Pond) Cypress. (Probably also called black cypress.)

(Map 9, Fig. 15)

This tree has been confused with the preceding by most botanists, foresters and lumbermen, and nearly all geologists and soil mappers; but it differs in being smaller (hardly ever more than two feet in diameter above the enlarged base and fifty feet tall), the base often more abruptly enlarged and always with rounded instead of sharp ridges, the bark thicker and coarsely ridged (this difference can often be seen even in crossties, which have only a small strip of bark left), the trunk always a little crooked (in mature trees), the knees usually wanting, but when present short and rounded, and the leaves appressed to erect branchlets instead of flat and horizontal (except on young shoots, where they may be indistinguishable from those of the other species). Its distribution, habitat, and relations to fire are also different, as will be pointed out presently.

Its economic properties are about the same as those of *T. distichum*, except that the trunks are usually too small and crooked to make boats out of. Its principal uses are for telegraph and tele-

*See Bull. Torrey Bot. Club 33:525. 1906.

FIG. 15. Scattered trees of *Taxodium ascendens*, with a few slash pines, in savanna about seven miles west of Lillian, Baldwin County. Photograph by Dr. E. A. Smith and R. S. Hodges, August 13, 1902.

phone poles and crossties. In Washington, D. C., I have seen one of the large hollow bases with a few feet of the trunk inverted and used for a flower urn in a yard (and it lasted at least twenty years, and may be there yet). This species, like the other, is occasionally planted in parks and along streets in the North and in Europe, and it is or has been known to the horticultural trade as "*Glyptostrobus pendulus*," and erroneously considered a native of China or Japan.

References: Harper 1, 2, 13.

This species grows in shallow ponds, and swamps of branches and creeks which are seldom or never muddy and do not fluctuate more than two or three feet. Fire sometimes sweeps through such places in dry seasons, but does little harm to the cypress, on account of its thick bark. Its range is much more restricted than that of *T. distichum* (see map), and it seems to be confined to regions where late summer is the wettest season. Its known distribution by regions is as follows:

10E. Shallow ponds in Coffee County a few miles southwest of Elba, and in southern edge of Dale County.
12, 13. Rather common in ponds and along small streams.
15. Occasional on bay shores, Baldwin County.

CHAMECYPARIS, Spach. (Cedars)

Chamaecyparis thyoides (L.) B.S.P. Juniper (White Cedar.)

An evergreen tree looking something like the common red cedar, but usually easily distinguished by its habitat. It has very durable wood, much like the cypresses, and is therefore largely used for poles to carry electric wires, as well as for cross-ties, fence-posts, palings, shingles, boats, water-buckets, etc. It is sometimes cultivated for ornament (more in the North than in Alabama), and about a dozen horticultural varieties are recognized by the trade. Other uses on record for the wood are interior finish, gunpowder, charcoal, and lampblack.

References:—Hall & Maxwell 1, Harper 13.

Grows in cool swamps, with water that fluctuates very little with the seasons and is practically free from mud, lime, iron and sulphur. Part of the water supply of Mobile comes from streams in which it grows, and the same was formerly true of Brooklyn, N. Y. Although it ranges northward to New England, in Alabama it is confined to the southwestern pine hills (region 13), in which its known distribution by counties is as follows:

Washington: Creek swamp near Calvert.

Mobile: Cedar Creek, in the northeastern part of the county, is probably named for this species, and it grows also along several creeks within about 15 miles of Mobile, in various directions. A few specimens seen near Grand Bay.

Baldwin: Above Tensaw (Bartram). On the shores of Mobile Bay near Fairhope, and north of Daphne, along Fish River between Fairhope and Silver Hill, and along two or three very clear small creeks a few miles east of Foley.

Escambia: Along Escambia River at several places.

JUNIPERUS, L. Cedars and Junipers.

Juniperus Virginiana, L. (*Sabina* of some authors) (Red) Cedar

(Map 10, Figs. 16, 17)

A well-known evergreen tree, blooming in early spring, and attaining a considerable size when it has a chance, but it has been so extensively exploited for its wood that trees over a foot in diameter are now scarce, outside of cultivation.

It has long been cultivated for ornament, and occasionally for hedges, in all the eastern states, and to some extent in Europe. (Sudworth lists 31 horticultural varieties.) Straight driveways lined with double rows of cedar lead from the highways to the front steps of many old mansions in the South, especially in calcareous regions. The uses of the wood are various, some of them based on its durability, some on its softness and straight grain, some on its color, and some on its odor. Long logs are used for piles, telegraph and telephone poles, and trestle bents, and shorter pieces for fence-posts. Sawed lumber is made into buckets, churns, clothes-chests (on account of the odor, which repels moths), and especially for pencils. In Middle Tennessee, where it is one of the most abundant trees, and pines are scarce, cedar was formerly used a great deal for building houses, boats and furniture, and even for cross-ties and fence-rails.

No other wood has been found which possesses just the right physical properties for the casing of lead-pencils, and the supply of straight-grained cedar suited for this purpose is now barely sufficient, so that its use for other purposes (except perhaps fence-posts, for which knotty pieces will answer just as well) has fallen off considerably. When used for pencils its durability, color and odor are no object, and these qualities are therefore wasted, one might say. The shavings are used to keep away moths, and a valuabl oil is made from the wood and green twigs.

Several writers on the subject have expressed the opinion that the supply of cedar was rapidly approaching exhaustion, but the gloomiest predictions about it have not been realized. F. A. Michaux, author of a North American Sylva, seemed to think it was on the verge of extinction over a hundred years ago, when most people had little use for pencils and the number of possible consumers was only a fraction of what it is now; but judging from

FIG. 16. *Juniperus Virginiana* on limestone outcrops in Jones Valley between Grasselli and Wheeling, Jefferson County. September 30, 1912.

the quantities that one can still see in the eastern part of the Tennessee Valley, growing on the mountain slopes or piled up awaiting shipment at nearly every railroad station, the end of our supply is not yet in sight. It is true that the largest trees have disappeared, but there are still about as many small ones as ever, most of them on land too rocky to plow, which seems better suited for the growing of cedar than anything else. And if the native stock should ever get too depleted it could be supplemented by cultivation, to which this species responds very readily. It will grow in any temperate climate that is not too dry, and in almost any soil that is not too wet.

References: Harper 9, Mohr 23, White.

The red cedar has quite a variety of natural habitats, ranging from dry cliffs—of both limestone and sandstone—and gravelly ridges to damp shady flatwoods and hammocks, shell mounds, and edges of salt marshes. It is also common along fences and roadsides, where birds have dropped the seeds. But all its diverse habitats seem to have one thing in common, and perhaps two. First, they are well protected from fire by the topography, proximity of water, sparseness of the surrounding vegetation (as on rocks), or dampness of the humus. It also seems likely, though that point has not been specially investigated, that earthworms are rare or absent in the soils in which it grows naturally. This is certainly true of the cliffs, and probably of the strongly calcareous

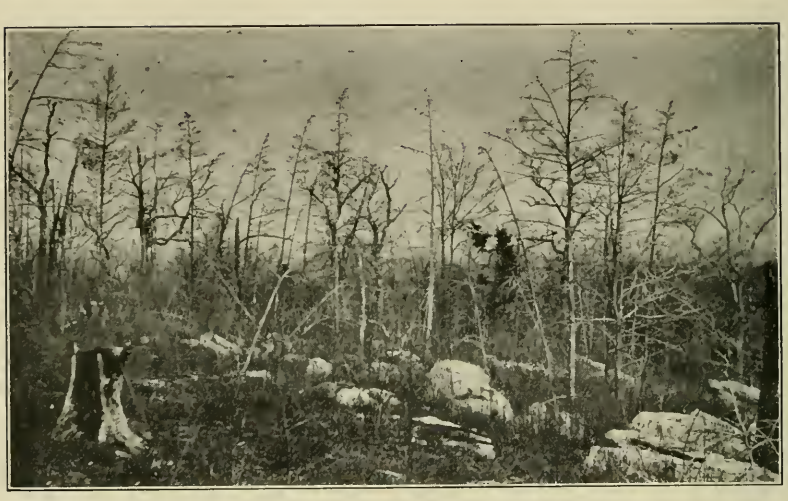
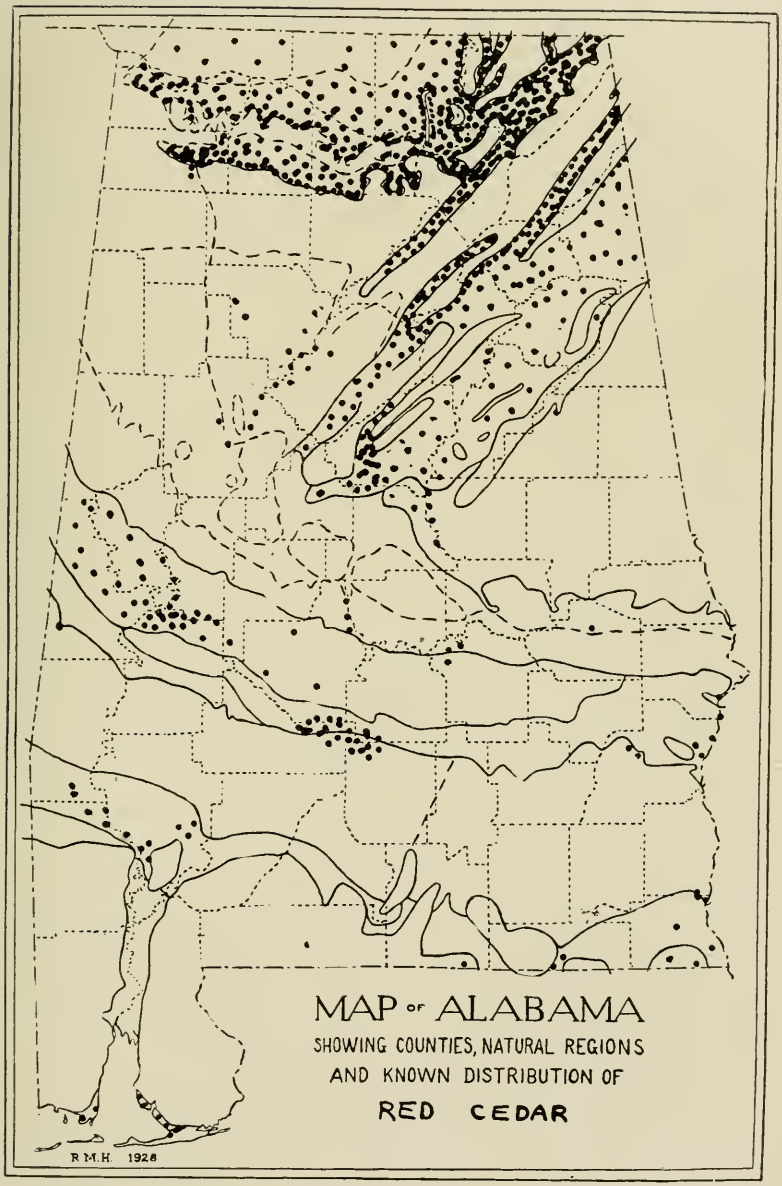


FIG. 17. Burned forest of *Juniperus Virginiana* on limestone slopes of Smithers Mountain (above the Hartselle sandstone), Madison County, March 16, 1913. This is a very unusual sight, for the habitats of the cedar are generally well protected from fire. The fire probably originated in the oak woods on the sandstone below, and ran up the slope.

soils. In Alabama and other southern states the cedar is commonly regarded as being especially partial to limestone, but there seems to be no such relation in New England, and even with us it grows perfectly well on granite and sandstone.

The cedars near the coast of the southeastern states are regarded by some of the splitters as a distinct species, which has been called at different times *Juniperus Barbadensis, J. Lucayana,* and *Sabina silicicola;* but the alleged differences are very small. And if there were really two species in these states one of three conditions could have to be fulfilled. First, their ranges might be entirely distinct and widely separated, like those of the closely related *Pinus Virginiana* and *P. clausa,* already mentioned. But there is no considerable gap, as the map shows, and if the coast cedars are really different from those in the Tennessee Valley those in the lime hills would probably have to be put with them. Second, they might intergrade over an ill-defined zone, as many pairs of doubtfully species seem to do. But the splitters have not suggested any intergradation. Third, they might overlap and occupy different habitats in the zone common to both, like our two



MAP 10. Distribution of *Juniperus Virginiana*.

cypresses. But that has not been demonstrated either. So for the present at least it seems best to treat our red cedars as all one species.

Its known distribution by regions is as follows:

1A. Rocky places near Elkmont, Florence, etc.

1B. Very abundant on limestone on mountain slopes and river cliffs, and scattered in the red valley lands. It seems to be the commonest tree in the region at present, and perhaps always has been.

1C. Weeden Mountain, Madison Co., and Little Mountain, Colbert Co.; on sandstone.

2A. On sandstone cliffs, frequent but nowhere abundant.

2B. On shaly bluffs, etc., mostly along rivers.

3. Fairly common on limestone outcrops and in flatwoods, especially in Jefferson County.

4. On high cliffs, Cedar Mountain, Clay County.

5. Rather rare, mostly in rocky places along the Coosa River and elsewhere.

6A. Occasional along roadsides, but rare in perfectly natural places.

6C. Old fields, etc., and possibly native in a few places in Autauga and Dallas Counties.

7. Common on chalk outcrops and river bluffs, especially westward

8. Bluffs, etc., rare. Montgomery and Barbour Counties, and perhaps in the northern edge of Wilcox.

10E. On limestone near Clayton and Lawrenceville, and along the Pea River in Coffee County.

10W. Abundant in northeastern Wilcox County and adjacent Butler, on limestone at the base of the Eocene. A good deal of it was cut off long ago by a pencil mill at Greenville.

11. Frequent on limestone outcrops and bluffs. Said to have been exported from the vicinity of Suggsville about ninety years ago.

12. Limestone outcrops mostly. Covington, Geneva and Houston Counties.

13. Along creeks near Brewton.

15. On shell mounds and shores of estuaries.

GRAMINEAE (OR POACEAE). Grass Family

Includes about 4,500 species, in all parts of the world. The bamboos and their relatives, native of warm climates, are woody, but the great majority of grasses are herbaceous. Their seeds and foliage furnish more food for man and beast than any other family of plants. Some yield fiber and building material, and many are cultivated for lawns or for ornament.

ARUNDINARIA, Michaux. Canes and reeds.

This genus is not very fully understood, partly on account of the scarcity of flowers and seeds, and the number of species in North America may be anywhere from one to three or four. In Alabama there seem to be two, or possibly three.

Arundinaria macrosperma, Mx. (*A. gigantea*, Chapm.)
(Large) Cane

(Figs. 18, 19)

The stem of the cane, like its tropical relatives the bamboos, combines lightness with strength to a remarkable degree, and for that reason it is used very largely for fishing poles. Being hollow, single joints are also used by small boys for popguns and similar toys. The leaves are evergreen or nearly so in our climate, and the plant is offered for sale for ornamental purposes by some nurserymen.

There are traditions of remarkably luxuriant growths of cane in Alabama and other southern states a century and more ago, which would be hard to believe if they did not come from so many independent and apparently reliable sources. According to Maj. Harry Hammond, it is said to have once covered almost the whole face of the earth in upper South Carolina.* Early settlers in the black belt of Alabama found it (or possibly the other species) so abundant there that they called that the cane-brake region; a name still in occasional use. Down in the western division of the red hills, or adjacent line hills, the trail from Claiborne to Suggsville early in the last century is said to have traversed a dense thicket of it, where the canes on both sides were worn by the saddle bags of travelers, and grew as high as a man on horse-back could reach with an umbrella.† Bartram in the 18th century claimed to have seen specimens of it in the Mobile delta which were three or four inches in diameter and thirty or forty feet tall.‡ But I have never seen one much over an inch in diameter and twenty feet tall. Just what happened to these vast thickets of tall cane is somewhat of a mystery. No doubt grazing and fire have had much to do with their disappearance, but one would hardly suppose that they could have been completely wiped out in that way from such large areas, and then superseded by other native plants which seem perfectly at home and look as they might have been there for centuries.

The large cane blooms in April, but apparently only in the last year of its life, when it may be as much as fifty years old;

*South Carolina (handbook), p. 146. 1883.
†T. H. Ball, (History of) Clarke County, p. 174. 1882.
‡Bartram, Travels, (ed 1), p. 410. 1791.

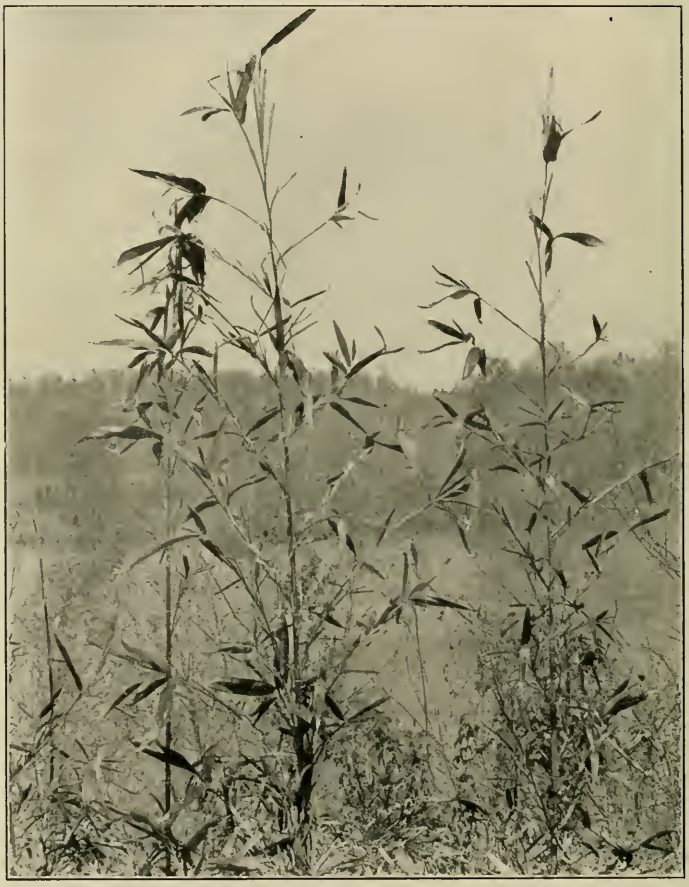


FIG. 18. *Arundinaria macrosperma* on left bank of Warrior River about a mile below Holt, Tuscaloosa County. April 10, 1906.

so that in any one locality the blooming and seeding of the cane may be witnessed only once in a generation or two and looked upon as a sort of miracle* Its present habitat is mostly on river banks and in creek swamps, a little below high-water mark, and its distribution in Alabama by regions is about as follows:

1B. Common along the Tennessee River and some of the larger creeks.
1C. Colbert County.
2B. Mostly on the Warrior River and its larger tributaries.

*See Mohr's Plant Life of Alabama, pages 103, 389.

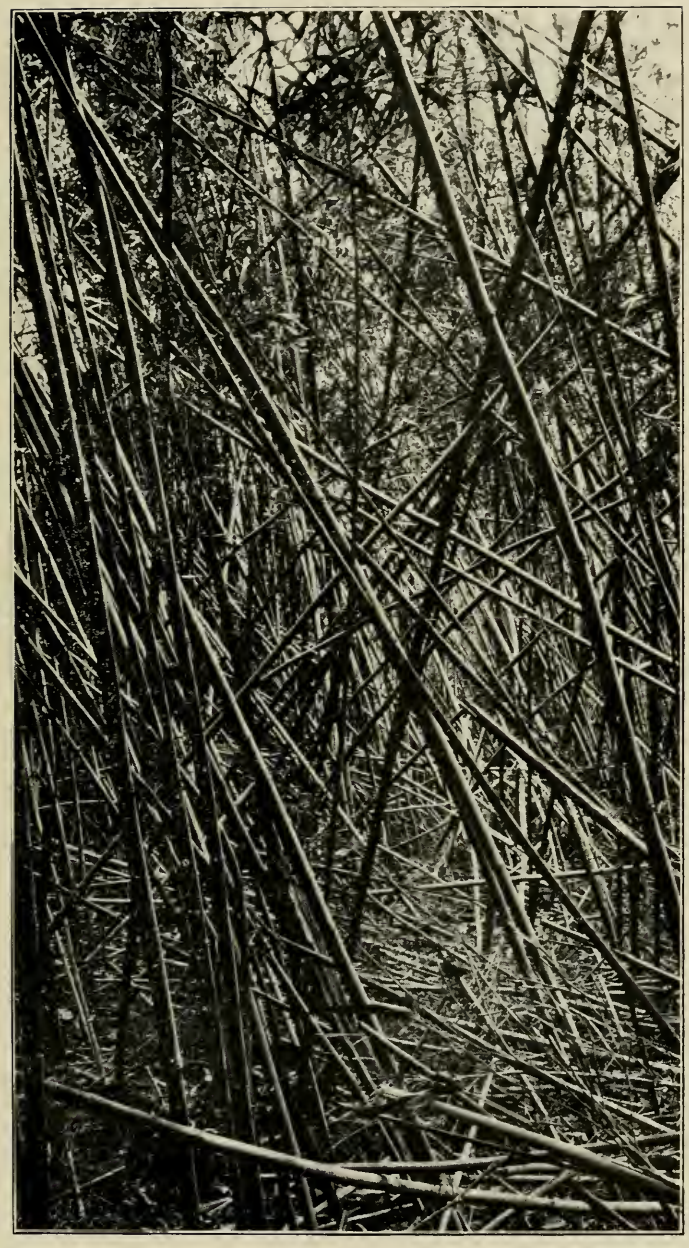


FIG. 19. Interior of dense cane-brake (*Arundinaria macrosperma*) on Big Creek, about four miles west of Northport, Tuscaloosa County. March 4, 1913.

3. Mostly on the Coosa River and its larger tributaries.
6A. Common along creeks, especially in Tuscaloosa County.
6C. On the Warrior and Alabama Rivers and their larger tributaries.
7 and 8. Fairly common.
9. Sumter and Marengo Counties.
10E. On Conecuh River near Hallsville, Pike Co., and doubtless on other streams.
10W, 11. Frequent.
14. In upper portion of the delta.

What may be another species, resembling *A. macrosperma* except in size (being smaller) and habitat, grows on sandstone, shale and limestone, cliffs in various parts of the state, as follows:

1B. On limestone mountain slopes, within a few miles of the Tennessee River in Jackson, Madison and Marshall Counties.
2B. Bluffs near Simpson's Creek, Cullman County. Cliffs near Warrior River, Walker and Tuscaloosa Counties.
3. Near Sylacauga.
11. Hatchetigbee Bluff on Tombigbee River, Washington County.

Arundinaria tecta (Walt.) Muhl. SMALL CANE OR REED

(Fig. 20)

This species rarely if ever exceeds half an inch in diameter and ten feet in height, and most of the specimens at the present time seem to be only about knee-high. It is shorter-lived than *A. macrosperma,* and therefore blooms at shorter intervals. It is evergreen in this latitude, though perhaps not in Virginia. It is offered for sale by nurserymen, and is more graceful and perhaps easier to handle than the large cane. Its stems are too small and weak for fishing poles, but the leaves and young shoots make excellent forage for cattle. The Choctaw Indians in eastern Mississippi make baskets of it.

It grows mostly in sandy bogs, wet woods, and non-alluvial swamps, south of the coal regions, as follows:

2A. Along Eight-mile Creek, Cullman County.
4. Along branches 1500 to 1900 feet above sea-level on the southeast slopes of the Blue Ridge in Clay County, and along a small creek west of Hollins.
5. Frequent, mostly southward.
6A. Fairly common from Marion County southward, perhaps reaching its best development in creek swamps in Tuscaloosa County.
6B. Common in sandy bogs in Chilton and Autauga Counties.
6C. Frequent.
7. Said by Dr. Mohr to be the cane which gave this region one of its popular names; but now apparently rare, except in a few damp sandy places.
8. Crenshaw, Pike and Barbour Counties.
9. About five miles southwest of Livingston.

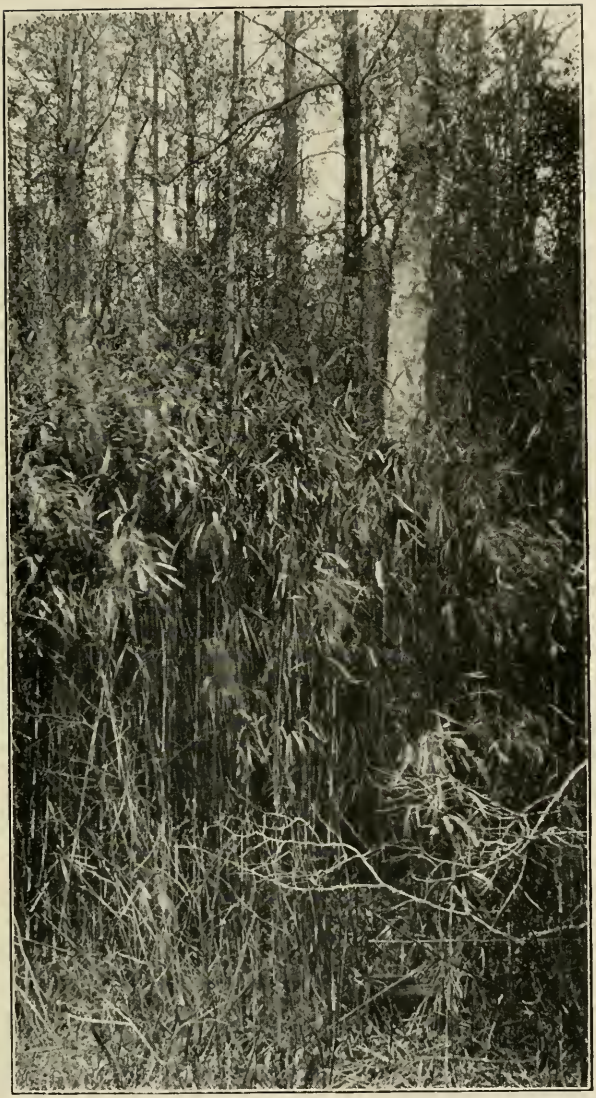


FIG. 20. *Arundinaria tecta* in (non-alluvial) swamp of Cribbs's Creek, about two miles south of Tuscaloosa. March 16, 1906.

10E. Frequent.
10W. Occasional.
11. Near Monroeville.
12. Near Dothan.
13. Scattered throughout.
14. Near Magazine Point, Mobile Co.

PALMAE (or ARECACEAE). Palm Family

About 1,000 species, in tropical and warm-temperate regions, all more or less woody, with large stiff evergreen leaves; and many of them are tall unbranched trees. Most of the palms are ornamental, and many yield building materials, fiber, oil, food or medicine.

SABAL, Adanson. The Palmettoes.

Sabal minor, Jacq. (*S. glabra* (Mill.) Sarg.; *S. Adansonii*, Guerns.) (Dwarf, or swamp) Palmetto.

(Map 11)

Our commonest and most widely distributed palm, with smooth fan-like leaves sometimes four or five feet tall; blooming in June and July. Very little use is made of it in Alabama, except that the leaves have been shipped from Evergreen for decorative purposes, along with other evergreens. They could also be used for fans, and woven into hats, baskets, etc. The leaves are often nibbled by cattle, especially when young.

Grows normally in muddy swamps, but also common in low calcareous pastures in the black belt and near-by regions. Almost confined to the coastal plain.

5. Rare on Tallapoosa River a few miles above Tallassee, with *Taxodium distichum, Tillandsia usneoides,* etc. Said to have formerly occurred on the Coosa County side of the Coosa River a little above "Lock 12", but submerged by the big dam there about 1914.*

6A. Bottoms of Big Sandy Creek near Duncanville, Tuscaloosa County.

6C. Near Aliceville, Akron and Burnsville.

7. Frequent, often in pastures as above stated.

8. Bottoms of Pine Barren Creek, Wilcox County.

10E. Along rivers near Newton and Elba.

10W. Choctaw, Marengo, Clarke and Conecuh Counties.

11. Choctaw, Washington, Clarke and Conecuh Counties.

12. Near Geneva and Gordon.

13. Along Conecuh River east of Brewton.

14. Common, at least in the lower part. L. C. Johnson, on page 696 of the Alabama coastal plain report (1895) describes a large "palmetto brake" in Baldwin County, which must be in the delta, though he does not specify the locality.

15. Near Coden, Bon Secour and Orange Beach.

*See Torreya 14:155. 1914.

SERENOA, J. D. Hooker. (Only one species.)

Serenoa serrulata (Mx.) B. & H. (*Corypha repens* Bartr.?)

SAW-PALMETTO

(Map 11)

Readily recognized by its pale yellowish green leaves, with stalks armed along the edges with short stout prickles. In Alabama and most other parts of its range its coarsely fibrous trunk or rootstock lies prostrate on or just below the surface of the ground, and its foliage is not more than knee-high; but in some parts of Florida, where there is sufficient protection from fire, the leaves may be five or six feet tall, or the trunk may stick up in the air as much as ten feet, obliquely or even vertically. It blooms mostly in June, but perhaps not every year in the same plant.

The leaves of this species are not quite as good as the preceding for decorative purposes, but the plant is more useful in other ways. In Florida, where it is most abundant, short sections of the trunk are made into brushes, and the leaf-stalks are sometimes shredded into "hair" for plastering. Mattresses have been made from the leaf-fiber in South Carolina, according to Porcher. The plant contains considerable tannin, and is claimed to be suitable for paper pulp also. The terminal buds are edible, and the tender young leaves are browsed by cattle. Hogs like to eat the ripe fruit, which is about the size of a plum. This fruit has important medicinal properties, and is officinal in the U. S. Pharmacopoeia. Large quantities of it have been shipped from Florida to patent medicine manufacturers.

This species is confined to regions with mild climate and rainy summers, and in most parts of its range it grows in nearly pure sand, where the ground-water is never far from the surface. It can stand considerable fire. Its known distribution in Alabama is about as follows:

12. In deep sand along Pea River and Double Bridges Creek near Geneva.

13. Sand along creek east of Flomaton (December, 1905), along Chickasawbogue Creek from about 11 to 21 miles northwest of Mobile, and also in the vicinity of Mount Vernon and Grand Bay, and in the flat country bordering the bay south of Mobile. In Baldwin I have seen it near Little River at the north edge of the county, near Fish River east of Fairhope, and southeast of Foley.

15 Near Orange Beach, Baldwin County.

Map 11. Inland limits of *Sabal minor* and *Serenoa serrulata*, and known distribution of *Rhapidophyllum Hystrix*.

FIG. 21. *Rhapidophyllum* in swamp of Murder Creek, southwest of Evergreen, Conecuh County. December 17, 1905.

RHAPIDOPHYLLUM, Wendland & Drude.

(Only one species)

Rhapidophyllum Hystrix (Pursh) W. & D. (NEEDLE PALM)

(Map 11, Fig. 21)

This has foliage much like *Sabal minor*, but a short thick erect trunk thickly covered with long sharp erect spines, whence its name. The flowers and fruit must be very rare, for I have never seen them.

Around Evergreen twenty years ago this palm was being exterminated by the evergreen shippers, who dug up "crowns" of it (i. e., the bunch of leaves without roots), stuck them in pots or vases, and shipped them north to decorate the homes of rich people for a few days or weeks and then wither. (I could not find any of it there in the spring of 1921.) It is occasionally cultivated for ornament, in Montgomery and elsewhere.

It grows in rich damp, especially calcareous, woods in the southern half of the state, sometimes with *Sabal minor*, but usually

farther from streams. It is rather rare, and the only locality known to Dr. Mohr was the first one listed below.

5 (or 6A). Found a few miles south of Auburn by F. S. Earle.

6C (?). In A. H. Howell's "Biological Survey of Alabama" (North American Fauna No. 45, 1921) there is an illustration (plate 7, fig. 2) entitled "River bottom swamp near Seale. Undergrowth of palmetto *(Sabal minus)* in hardwood forest." The palm in the picture looks more like *Rhapidophyllum* than *Sabal*, and Mr. Howell informs me that the picture was taken on Big Uchee Creek, about twelve miles northwest of Seale.

7. Bottoms of Big Swamp or Letohatchee Creek, Lowndes County. Bottoms of Bughall Creek between Fitzpatrick and Thompson, Bullock County. There it is quite common, and seems to be the only palm.

10E. Bluffs on Pea River near Elba, rare. Along Choctawhatchee River in northern Henry County (Howell).

10W. Probably in Butler County, but exact locality unknown. (See Bull. Torrey Bot. Club 33:526-527. 1906.) Seen in bottoms of Sepulga River near southwestern corner of that county, April 19, 1928. Common on bluffs on west side of Alabama River near old Lisbon landing, Monroe County. (Walter B. Jones, Sept., 1925). Rich woods near Limestone Creek northeast of Claiborne.

11. Common in bottoms of Murder Creek near Evergreen, at least in 1905.

LILIACEAE. Lily Family.

In the broadest sense this includes over 200 genera and 2,000 species, the great majority herbs, widely distributed over the earth. But some authorities divide it into several families, and put our woody representatives, and a few other genera, into the Dracaenaceae, typified by *Dracaena Draco,* the dragon tree of the Canary Islands, which yields a resin used in the arts, known as dragon's blood.

YUCCA, Linnaeus.

A common genus in the southwestern states and Mexico, where some are tree-like, and conspicuous in the desert landscapes. The southeastern species are rather few and small.

Yucca aloifolia, L. Spanish Bayonet.

A plant of somewhat palm-like aspect, with simple upright stems several feet tall, densely covered with rigid sharp-pointed and saw-edged widely spreading evergreen leaves about a foot long. Topped by a large cluster of tulip-like white flowers in summer. A favorite ornamental plant in the warmer parts of the United States, giving a semi-tropical but more or less forbidding aspect to many a park and lawn, at least as far north as Tuscaloosa.

Grows in drifting sands along the coast, and occasionally escapes from cultivation around old settlements in the interior of the coastal plain, for example, along roadsides between Prairieville and Faunsdale, near the line between Hale and Marengo Counties, in the black belt.

Yucca filamentosa, L. BEAR-GRASS.

It is stretching the definition a little to call this a woody plant, but it is about as much so as our palmettoes. It has rather stiff evergreen leaves in a knee-high tuft, and a branched flower-stalk in summer, often taller than a man.

It grows in a considerable variety of habitats, from sunny old fields to shady bluffs (if it is all one species), but all have one characteristic in common: they are well protected from fire. It is nowhere abundant, however, and the following list includes all its known natural habitats in the state. (It is liable to turn up almost anywhere in old fields.)

1B. Rocky woods near Blount Springs.
2B. Common on shaly bluffs near rivers, especially in Tuscaloosa County.
5. Seen from train once in Clay County. Common in northeastern part of Chilton County.
11. On bluffs, Clarke and Monroe Counties.

SMILACACEAE. SMILAX FAMILY.

Contains three genera and about 200 species, mostly woody vines, in tropical and temperate regions. Mostly American.

SMILAX, L. GREENBRIER, BAMBOO VINE, ETC.

Mostly prickly woody vines, climbing by tendrils, some evergreen and some not. They have berries about the size of a buckshot, black in most species. Some of the species are ill-defined or imperfectly understood, so that their number cannot be stated exactly, but there seem to be eight or ten woody ones in Alabama. Only six have been identified by the writer, but a reader who is sufficiently interested can find some information about the rest of them in Mohr's Plant Life of Alabama. Some of them are cultivated for ornament or gathered for decorative purposes, and a few have a limited use in medicine.

Smilax glauca, Walt.

A low vine often rising only a foot or so above the ground and running horizontally only a yard or so, but occasionally climbing into bushes. Easily recognized by its pale leaves, which are almost white beneath. Apparently native in dry open woods, but seen oftenest in old fields that have been abandoned a few years, and occasionally even in cultivated fields. More tolerant of fire than almost any other vine. On account of its weedy tendencies I have not made very full notes on it; but the following records will give some idea of its wide distribution.

2A. Morgan, Cullman and Marshall Counties.
2B. St. Clair County.
3. DeKalb, Calhoun and Jefferson Counties.
4. Clay County.
5. Doubtless common, at least in old fields, but I seem to have made no note of it there.
6A. Fayette, Tuscaloosa and Bibb Counties.
6B. Autauga County.
6C. Hale County.
7. Hale, Dallas (?) and Lowndes Counties.
8. Dallas (?), Russell.
10E. Henry County.
10W. Monroe County.

Smilax rotundifolia, L. (Common greenbrier of the North)

More than one species may have been confused with this, but what I take to be it is a deciduous vine, growing in woods or bottoms, and often in thickets, along roadsides, and in other weedy places, but always pretty well protected from fire.

It is common in the northern half of the state, except in the Blue Ridge and central long-leaf pine hills, and is seen occasionally in the black belt and post oak flatwoods. Definite records farther south seem to be wanting.

Smilax auriculata, Walt. *(S. Beyrichii,* Kunth.)

An evergreen, climbing on bushes and small trees.

Common on old dunes with dazzling white sand, near Orange Beach, Baldwin County. Reported by Dr. Mohr from the [Mobile?] bay shore of the same county, and the foot of Spring Hill in Mobile County.

Smilax laurifolia, L. BAMBOO VINE.

A smooth vine with comparatively few prickles and thick evergreen leaves, which are usually narrow and stand erect, so as to present only a small surface to the mid-day sun. Often climbs trees of considerable height. It can be used for decorative purposes, but the leaves turn brown in a few days.

Grows in sandy bogs and wet woods with sour soil: practically confined to those parts of the state where less than 5% of the area was cultivated in cotton in 1880, according to Dr. Smith's map in the 6th volume of the Tenth Census (map 2 of this work). (This probably holds true also in other states.) Its known distribution by regions is as follows:

2A. Along Little River on Lookout Mountain. (See Torreya 6:114. 1906.)
4. Along branches on southeast slope of Blue Ridge in Clay County. (See Torreya 10:219-221. 1910.)
5. Rather rare. Randolph, Tallapoosa, Elmore and Chilton Counties.
6A. Common from Franklin County southeastward.
6B. Common in Chilton and Autauga Counties, and probably elsewhere.
6C. Occasional.
7 (or 8?). Southern Dallas County.
8. Pike and Barbour Counties.
10E, 10W. Frequent.
11. Clarke and Conecuh Counties.
12. Common.
13. Abundant throughout.

Smilax Walteri, Pursh.

A deciduous vine, with bright red berries which hang on all winter, and therefore make it desirable for decorative purposes.

Grows in swamps, with more fertile soil than those favored by *S. laurifolia*. Confined to the coastal plain, or nearly so.

6A. Elmore County.
6B. Autauga County.
6C. Pickens County.
10E. Henry County.
11. Suggsville and Clarke Counties (Denny).
12. Covington, Geneva and Houston Counties.
11 or 13. Abundant along Murder Creek above Kirkland.
13. Mobile and Baldwin Counties.
14. Baldwin County.

Smilax lanceolata, L. WILD SMILAX OR BAMBOO

A neat evergreen vine with few or no prickles, climbing on trees. Its leaves keep their shape and color pretty well for a few

weeks after the stem is cut, and this makes it very desirable for decorative purposes. The berries are greenish or slightly tinged with red when ripe, but are not found on every vine every year, so that they do not add much to its appearance.

This might be called the vine that made Evergreen famous. It was first shipped from there to northern markets by G. W. Caldwell about 1888*, and large quantities have been shipped from there and other places in southern Alabama since, so that the natural supply must be considerably depleted by this time. But as it grows readily on various trees that spring up in fence-corners, it is not likely to be exterminated very soon. In addition to its decorative value it might be useful in a small way for stock feed, for Mr. Caldwell found that cows were very fond of the scraps left over when the vines were prepared for shipment.

It is almost confined to the coastal plain, in ravines, hammocks, bluffs, fence-rows, and other places protected from fire.

2B. Ravines and bluffs near Warrior River a few miles above Tuscaloosa.
3. Along Pratt's Creek, Bibb County, and near Pelham, Shelby County (if I have identified it correctly from the train).
5. Within a few miles of the Coosa River in Coosa and Elmore Counties.
6A. Tuscaloosa, Bibb and Elmore Counties.
6C. Hale and Autauga Counties.
7. Sumter, Dallas, Montgomery, Bullock.
8. Crenshaw, Pike, Barbour.
9. Along Alamuchee Creek near York.
10E. Barbour, Pike, Coffee.
10W. Wilcox, Choctaw, Clarke.
11. Along Murder Creek near Evergreen.
13 (?). Mobile County (Mohr).

Up to this point we have been dealing with coniferous (gymnospermous) trees and endogenous (monocotyledonous) canes, palms, vines, etc.; and it happens that the majority of them are evergreen. The remainder of the list consists of exogenous (dicotyledonous) angiosperms, most of which, in this state, are deciduous. The trees of this class are commonly known as hardwoods, although some of them have wood that is softer (and lighter) than that of some of the pines.

*See Caldwell in bibliography.

JUGLANDACEAE. Walnut Family.

Includes 6 genera and about 35 species, all trees with compound deciduous leaves, mostly North American. Many are useful for their wood or nuts, or both.

JUGLANS, L. The Walnuts.

Juglans nigra, L. Black walnut.

A well-known large or medium-sized tree, with dark brown heart-wood. Until it became too scarce it was the favorite material for cabinet-making and furniture of all kinds in the eastern United States. After the period of solid walnut furniture came that of walnut-veneered furniture, but even that is not common now. During the World War there was a great demand for walnut for gunstocks, and many isolated roadside and farm-yard trees were located with the aid of the Boy Scouts and sold to the gun factories. The wood is durable as well as handsome and easily worked, and when it was abundant it was used for crossties, posts, etc., and probably also for fence-rails. Its present use is mostly for sewing machines and musical instruments. Some is exported to Europe in the form of logs.

The walnut blooms in spring, just before the leaves unfold. The large oily nuts make very good eating, and enter into commerce in a small way in country towns. They are also used in confectionery. Their hulls were formerly used extensively for dyeing homespun cloth. The tree is often planted around houses in town and country, partly for shade and partly for the sake of its nuts.

References: Brush 2, Wheeler; also U. S. Forest Service Circular 88 (1907).

It grows naturally in rich woods and bottoms, in soils well supplied with lime or potash, or both, but can be cultivated in soils below the average in fertility, and is often seen along roadsides outside of its natural range. On account of its preference for rich soils, vast quantities must have been destroyed in clearing land in the pioneer days, and the present stand must be only a fraction of the original. Its known natural distribution in Alabama is about as follows:

1B. Fairly common in rich woods and on limestone outcrops, making perhaps one percent of the forest at the present time.

2B. Rich woods about two miles west of Oakman, Walker County.

3. Frequent in rich woods or around limestone outcrops in most of the counties, but not abundant. Makes less than one percent of the present forest.

7. Said by Dr. Mohr to have once been common in the black belt, but I have noted it in only a few places, such as near House Bluff, Marion Junc'ion and in Macon County. Prof. Cocks reported it from Dallas County.

8. Between Minters and Snow Hill station, in Dallas or Wilcox County.

10W. Rich calcareous woods in northeastern Wilcox County.

11. Rich calcareous woods near Suggsville and Salt Creek, Clarke County.

Juglans cinerea, L. WHITE WALNUT, OR BUTTERNUT.

A tree very similar to the preceding, except that the wood is paler, the fruit is oblong instead of spherical, and the leaves and hulls are sticky.

The inner bark of the root has cathartic properties, and it is also used for dyeing. The nuts are edible, and in the North they are sometimes made into pickles while young and soft. The tree is often planted for ornament, like the preceding.

This grows in much the same sort of soils as the black walnut, but is much rarer in Alabama, its center of distribution being farther north. Dr. Mohr reports it as having been found in Limestone County by Dr. Smith and in Winston County by himself, and I have seen what I took to be it once or twice in Blount.

HICORIA, Raf. (*Carya*, Nutt.) THE HICKORIES AND PECANS.

Trees, with alternate compound deciduous leaves. About a dozen species and several varieties have been reported from Alabama, but some of them are still imperfectly understood, and not easily identified. As a group they are among our commonest trees, one or more of them being found in every region, on a considerable variety of soils, but rather avoiding the richest and poorest. The flowers come out with the leaves in spring, and the nuts ripen in the fall of the same year.

Nearly all the hickories have tough elastic wood, useful for spokes, handles, hoops, buggy shafts, golf sticks, ladder rounds, bows and arrows, whips, etc. It is seldom sawed into lumber, but it makes good fuel, and the smoke of the wood (often made from sawdust) is used for smoking meat. Most of the species have

FIG. 22. Two pecan trees, supposed to be remnants of the original forest, in dark brown clay soil in the black belt, about half way between Marion and Uniontown, Perry County. September 25, 1924. The largest one had a trunk 38 inches in diameter. The other one had been struck by lightning not long before.

FIG. 23. Supposed native pecan trees in Walker's Bottom, about two and one-half miles west of Uniontown, in Marengo County, with a fallen trunk of same species about four feet in diameter in the foreground. September 25, 1924.

edible nuts. For notes on other economic properties see C. F. Hatch in bibliography.

The following species are the most easily recognized in Alabama. Information about a few others can be found in Mohr's Plant Life, and in manuals of North American trees or of southeastern plants.

Hicoria Pecan (Marsh.) Britton. *(Carya olivaeformis,* Nutt.) PECAN.

(Figs. 22, 23)

Chiefly noted for its edible nuts, of which several varieties have been developed in cultivation. (See "Nut culture in the United States", a 144-page illustrated report published by the Division of Pomology of the U. S. Department of Agriculture in 1896, and the paper by Dr. R. H. True cited in the bibliography of the present report.) A few wild hybrids between this and regular hickories have been reported.

The principal distribution of this species is from Indiana to Iowa and Texas, in alluvial soils, and it is rare or unknown in the wild state even in Tennessee and Mississippi. But there are a few old trees with rather small nuts in calcareous soils in the black belt north and west of Uniontown, which are said to have been there when the first settlers came, and are therefore presumably indigenous.* (Dr. Mohr reported it from near Demopolis, Gallion and Uniontown, all in the black belt.) That sounds reasonable, but it is difficult to get any other evidence on the subject, for the trees are now standing in fields, and all their original associates have been destroyed. It is cultivated in the same neighborhood, and in many other parts of the state.

Hicoria myristicaeformis (Mx.) Britton. (NUTMEG HICKORY)

The nuts of this tree are not considered edible, but its wood is probably as good as that of other hickories. It is too rare to be of any economic importance, though.

*See Mohr 15 in bibliography, also pages 100-101 and 462 of his Plant Life of Alabama. The writer visited some of these trees in company with the state forester in September, 1924, when the accompanying pictures were taken.

Dr. Mohr found this associated with the pecan near Demopolis, Gallion and Uniontown, and also on the Alabama River in Dallas County,* but nowhere else in the state. (See Mohr 15 in bibliography.) I have seen a few trees near Gallion and Barachias. All the known stations in Alabama are in the black belt.

Hicoria cordiformis (Wang.) Britton *(H. minima* (Marsh.) Britton, *Carya amara,* Nutt.)

A large or medium-sized tree, growing mostly along rivers. Wood of little use except for fuel. Nuts bitter.

Reported by Dr. Mohr from Montgomery County and elsewhere in the central parts of the state, and by Prof. Cocks from Dallas County.

Hicoria aquatica (Mx. f.) Britton. (Swamp Hickory)

A tree with leaves much like those of the pecan, bark resembling that of an elm, and flattish thin-shelled inedible nuts. It is hardly abundant enough to be of interest to wood manufacturers.

Grows in swamps of creeks and rivers, mostly in the coastal plain. Along Cotaco Creek (apparently in region 1C) in Morgan County, and along the Warrior-Tombigbee system from Tuscaloosa County to the upper part of the Mobile delta. Most frequent in the black belt and lime hills. Not yet noticed in regions 9, 10 E, 12 or 13.

Hicoria ovata (Mill.) Britton. *(Carya alba,* Nutt.)

Scaly-bark hickory.

A large or medium-sized tree, with bark peeling off in long stiff flakes, and perhaps the best nuts of any of our hickories proper. The wood is used for all the purposes previously mentioned under the genus. The bark and leaves have some medicinal properties, but are not officinal.

Grows mostly in clayey and calcareous soils. (One or two other species may have been confused with it in the following statement of distribution.)

1A. Near Hays Mill, Limestone County.

1B. Frequent in rich woods and on limestone outcrops, making perhaps 3% of the present forest.

1C. Weeden Mountain, Madison County, and Little Mountain, Lawrence County.

*Garden & Forest, 3:24. Jan. 8, 1890.

3. Fairly common in most of the counties, making about 1% of the forest.
6A. Marion and Chilton Counties; rare.
6C. Near Alabama River, Montgomery County.
7. Rich woods and bottoms; frequent.
8. Near Ramer, Montgomery County.
9. Creek bottoms.
10W. Butler, Wilcox, Choctaw, Clarke, and probably other counties.

A variety (*pubescens*, Sarg.) is said by the author to grow near Valley Head, DeKalb County.

Hicoria alba (L.) Britton. (*Carya tomentosa*, Nutt.)
(White) Hickory.

Wood similar to that of the preceding, but the nuts are not quite so good, having a little more shell and less meat in proportion.

Grows in dry and moderately rich (especially ferruginous) soils, in every region except 14 and 15. Scarce in 7, 8 and 13, but constitutes from one to two per cent of the forest in most of the others.

A variety (*subcoriacea*, Sarg.) is reported from Dallas County (Cocks).

Hicoria glabra (Mill.) Britton. (*Carya porcina*, Nutt.)
(Pignut) Hickory.

The wood of this is said to be the best of all the hickories, but the nuts are usually bitter and not eaten much except by squirrels. Like most of the other species, it is offered for sale by nurserymen for ornamental purposes.

Grows in dry woods, in soils apparently averaging a little poorer and less ferruginous than the preceding. It is not easily recognized from a train, so that my notes on it are not very complete (and I may have sometimes confused one or two other species with it), but it appears to be less abundant than *H. alba*. Its known distribution in the state is about as follows:

1B. On sandstone and chert on Smithers Mountain, Madison County.
2A. Cherokee, Blount, and St. Clair Counties.
2B. St. Clair and Tuscaloosa Counties.
3. DeKalb, St. Clair and Jefferson Counties.
4. Rather common.
5. Coosa County (and probably all the others).
6A. Franklin County to Bibb, and perhaps throughout.
6B. Tuscaloosa and Hale Counties.
7. Greene County (if identified correctly).
10E. Pike and Barbour Counties.

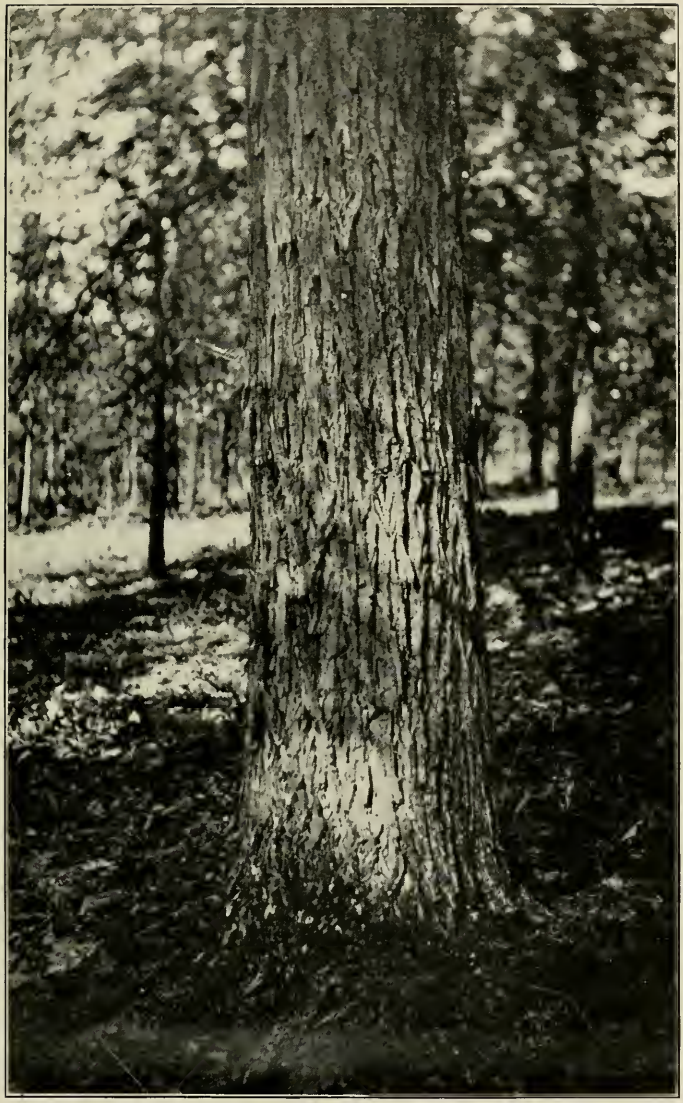


FIG. 24. Trunk of *Hicoria ovalis* (?), 18 inches in diameter, on chert ridge about two miles southwest of Bessemer, Jefferson County. November 19, 1911.

11. Near Silas, Choctaw County.
13. Near Andalusia.
15. Near Fairhope and Orange Beach, Baldwin County.

Two varieties have been credited to the southern part of the state.

Hicoria ovalis (Wang.) Sudw. (?) *(H. microcarpa* (Nutt.) Britton)

(Figs. 24-26)

A hickory which does not seem to fit any existing description exactly, but is referred tentatively to this species, is pretty widely distributed, though not abundant. It is a medium-sized tree with rough furrowed bark, leaves with usually five leaflets (occasionally seven, three or one), and small nuts with a thin husk splitting to the base, with one valve of the husk always wider than the others, and the opposite one correspondingly narrower.

Its favorite habitat seems to be dry cherty ridges. I have seen it in Lauderdale County near Florence, on top of Bean Mountain in Morgan County, on the slopes of Lookout Mountain near Valley Head (often with 7 leaflets), on Warnock Mountain, Blount County, on ridges a few miles from Bessemer, and in Coosa, Bibb and Montgomery Counties; and also apparently the same thing in Nassau County (Long Island), New York.

Two varieties are credited to the central and northern parts of the state by Prof. Sargent.

Other species of *Hicoria* which have been reported from Alabama, but not yet identified by the writer, are as follows:

H. Carolinae-septentrionalis, Ashe. (One of the scaly-barks.) Reported from Morgan and Cullman Counties by Mohr, and from Dallas County by Cocks. A variety (*australis,* Ashe) is said to grow near Montgomery.

H. laciniosa (Mx.f.) Sarg. (A scaly-bark with large nuts.) River banks in Dallas County (Cocks).

H. pallida, Ashe. Said to be common in dry soils in the central parts of the state. DeKalb County to Henry County (Mohr). Dallas County (Cocks).

H. Ashei Sudw. Said by its author to grow "in the coastal regions" from Alabama to South Florida.

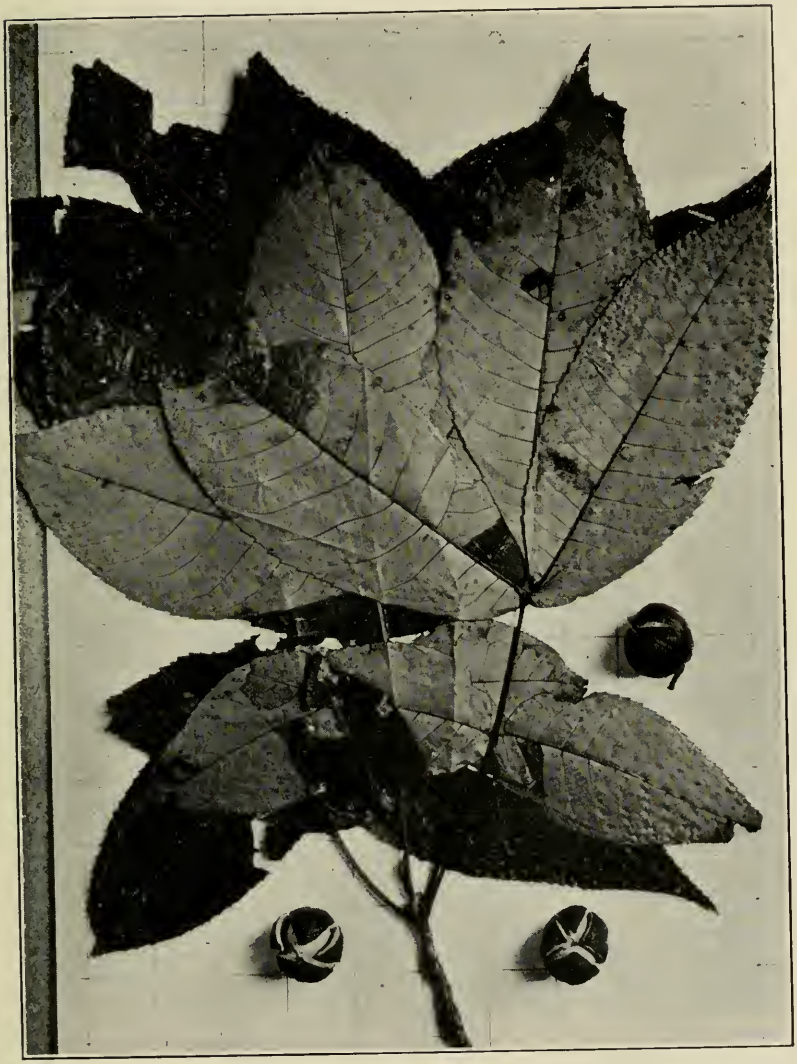


FIG. 25. Leaves and nuts of *Hicaria ovalis* (?), from the same locality as the preceding figure, collected October 5, 1912, and photographed later in the same month, against a background ruled in inch squares.

FIG. 26. Twigs and nuts of same, with leaves removed to show buds, on same background.

MYRICACEAE. Bayberry Family.

Includes two or three genera and about 50 species, mostly shrubs growing in temperate regions, and of little economic importance.

MYRICA, L. Bayberries or Wax Myrtles.

(Map 12)

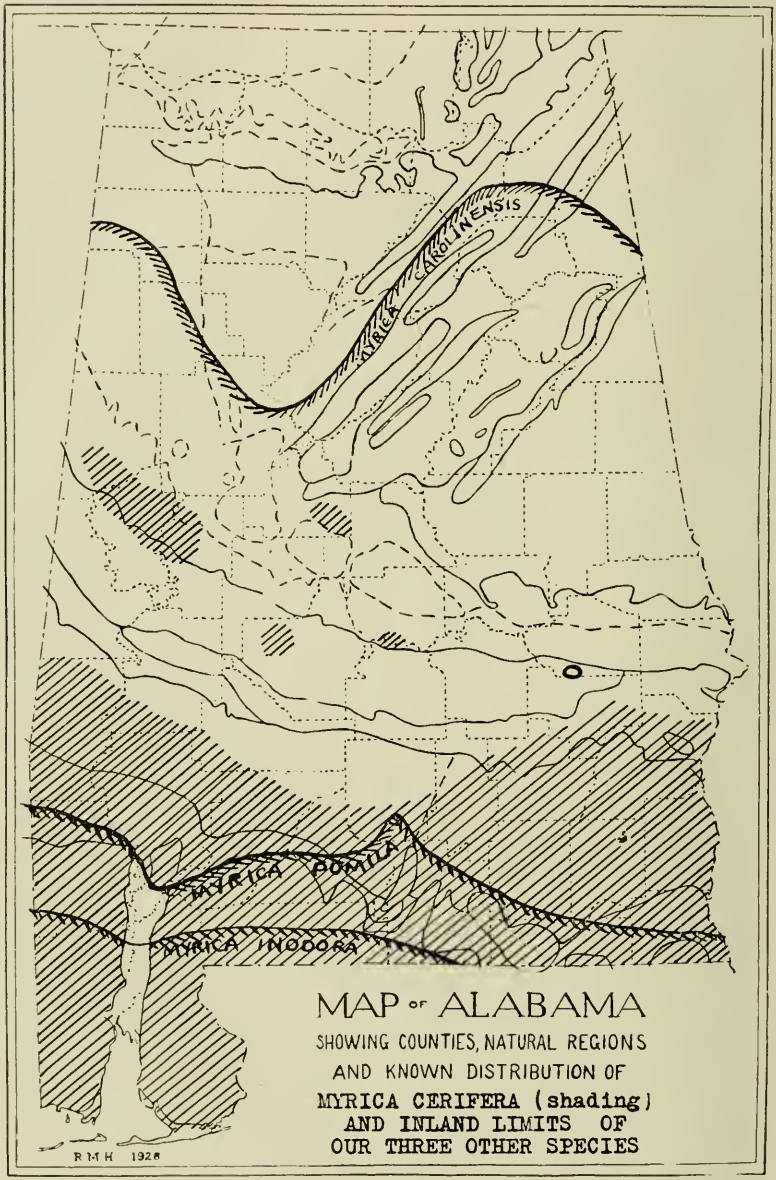
Our species are regarded by some authorities as distinct from the typical *Myrica* of higher latitudes, and the generic names *Morella* and *Cerothamnus* have been proposed for them. They are shrubs or small trees, evergreen with us (but one of them deciduous farther north), with inconspicuous flowers in small clusters on the branches below the leaves in spring, producing small hard wax-coated berries in fall. The wax can be removed by (soft) boiling water, and it was used largely for making candles before the days of petroleum products. Our species are all called "myrtle," when they are given any common name at all, though they are very different from the classical myrtle of the Old World.

Myrica cerifera, L.

An aromatic shrub or small tree, with leaning or crooked trunk branching low down, dark yellowish green toothed leaves, much reduced in size (and yellower) toward the ends of the twigs. Said by Dr. Mohr to grow a foot in diameter and 30 or 40 feet tall near the coast; but it is usually no higher than a man's head, and only a few inches in diameter. The leaves, and the bark of the root, have astringent properties, and the wax has a limited use in medicine, and is said to have been used for making soap and candles. The plant is occasionally cultivated for ornament, particularly along walks and borders. (A good deal of it was so used on the grounds of the Jamestown Exposition, near Norfolk, Va., in 1907.)

Strictly confined to the coastal plain, in moderately rich and often damp soils, protected from fire, as in hammocks and on bluffs and borders of swamps.

6A. Along the M. & O. R. R. at several places in Bibb County southeast of Centerville, particularly between Trio and Maud. Grows especially around cuts and gullies in grayish purple clay, where it has a somewhat weedy appearance.



Map 12. Distribution of our four species of *Myrica*. The ring in the southern part of Macon County belongs to *M. pumila*.

6C. Occasional in Pickens, Greene and Hale Counties.
6C or 7. House Bluff, Autauga County.
7. Near Lake Bend on Warrior River in Greene County, about twenty miles above Demopolis, and near Bogue Chitto, Dallas County. Reported from Dallas County by Cocks and from Montgomery County by Mohr.
8. Crenshaw County and eastward.
10E. Frequent.
10W. Common.
11, 12. Common.
13. Frequent.
14. Near Magazine Point, Mobile County
15. Near Fairhope and Orange Beach, Baldwin County.

Myrica pumila (Mx.) Small. (*M. cerifera*, var. *pumila*, Mx.)

To be absolutely consistent one should perhaps treat this as a variety of the preceding, as was done nearly throughout the 19th century; but it is more convenient to call it a separate species. It differs from *M. cerifera* in being smaller, usually not more than knee-high, and having a large subterranean stem, which enables it to shoot up again after the parts above ground are killed by fire, —a frequent occurrence in most of the places where it grows.

The berries are so small that it is probable that little or no wax has ever been made from them; but in Baldwin County I have been told that the dried bark of the root is sometimes used as a remedy for toothache and neuralgia.

Grows in sandy soil, dry or damp, in Alabama usually in open forests of long-leaf pine. (In Louisiana and Texas it is common in some parts of the coast prairies, away from all trees.)

Dr. Mohr reported it from Cullman and Autauga Counties, but those are remote from the present known stations, and it is possible that he mistook *M. Carolinensis* for it. It seems to be chiefly confined to the lower parts of the coastal plain. (See map.)

7. Flat pine woods *(Pinus Taeda)* about a mile west of Fort Davis, Macon County.
10W. Near Bolling, Butler County.
12. Washington, Covington and Houston Counties.
13. Common nearly throughout.

Myrica Carolinensis, Mill.

Differs from *M. cerifera* in never becoming a tree, and having paler leaves (never yellowish), which are not reduced in size at the ends of the twigs. It was pretty generally confused with *M.*

cerifera until about three decades ago.* but it is perfectly distinct. It is deciduous northward, but evergreen in Alabama. This is the principal source of bayberry wax, especially on Long Island and Cape Cod, where it is more abundant than with us. It is occasionally cultivated for ornament.

Grows in wet woods and sandy bogs, mostly where less than one per cent of the area was cultivated in cotton in 1880.†

2A. Marshall, Etowah and St. Clair Counties.
2B. Rare along Mill Creek, Jefferson County. Near North Alabama Junction and Eight-Acre Rock, Tuscaloosa County.
3. Damp pine woods northeast of Center, Cherokee County.
4. Damp ravines in the mountains, Clay County. Some five feet tall.
6A. Marion, Pickens, Tuscaloosa, Chilton and Elmore Counties.
6B. Tuscaloosa, Chilton and Autauga Counties.
10W. A few miles northeast of Camden, and in northern part of Choctaw County.
12. Near Dothan.
13. Fairly common.

Myrica inodora, Bartram.

Resembles *M. Carolinensis* somewhat, but grows larger—sometimes almost a tree—and has smoother leaves, which are odorless or nearly so, as the name implies. William Bartram, who discovered it in the northern part of Baldwin County about 150 years ago, found the people there making candles from its wax.

It grows in sour-branch-swamps, etc., and seems to be confined to the southern pine hills, from Middle Florida to southern Mississippi, where late summer is the rainy season. Within its limited range it is not at all rare, and I have seen it in Mobile, Baldwin and Escambia Counties, and perhaps also in Washington and Covington. Dr. Mohr found it near Mobile and Stockton.

SALICACEAE. Willow Family.

Two genera and about 200 species, trees and shrubs, mostly in the cooler parts of the north temperate zone. Some are used for lumber, basket-making, etc., and some are cultivated for shade or ornament.

---

*See Bull. Torrey Bot. Club, 34:374. 1907.

†For notes on its occurrence outside of the coastal plain see Bull. Torrey Bot. Club, 33:528-529. 1906; Torreya, 10:221. 1910.

SALIX, L. The Willows.

Salix nigra, Marshall. (Common, *or* Black) Willow.

A small to medium-sized tree, with trunk usually inclined a little from the vertical, especially if growing on the bank of a stream. Blooms in March, and ripens its feathery seeds about a month later.

The tree is sometimes planted, especially along roadsides in damp ground. The twigs of this and other willows are often bound together in huge raft-like mats and weighted down with rocks to protect river-banks from erosion where such measures are desirable. The wood is light, soft, and easily split, and is used to some extent for boxes, crates, and excelsior, but the tree is usually too small for saw-logs. Charcoal from it has been used in the manufacture of gunpowder. The bark contains salicylic acid, and has febrifugal and antipyritic properties. The flowers also have some medicinal value.

This willow grows along streams of all sizes, and in other damp places, and seems to tolerate any amount of seasonal fluctuation of water. It seems to like potash and lime, but has little need of nitrogen or humus. Just what its reaction would be to fire is not known, for the places in which it grows are pretty well protected from fire. It is often the first tree to take possession of new mud flats (either natural or artificial) and sand-bars. It behaves something like a weed, springing up along gullies and ditches in cultivated fields, and on mud flats made by washings from brown iron ore mines. It is the commonest tree along most of our rivers, especially on the soft banks on the inner sides of bends. Sometimes a steep bank on which it grows caves in and carries the roots of the willows several feet below the water-level, and in that case they are soon drowned, though the whole tree might be submerged for a few days by a flood without apparent injury. Probably most of the willows in the state at the present time are small trees not over ten or fifteen feet tall, growing in places which have been modified by civilization.

It is common in every region except 1A, 1C, 2A, 4 and 15, and probably grows in every county.

Salix humilis, Marshall. (Dwarf) Willow.

The shrubby willows, so common and perplexing in the glaciated regions of the United States, are rather rare in Alabama, and probably most of those in the state are referable to this species. The flower-buds, which appear long before the leaves in earliest spring, are covered with silky down and somewhat resemble a kitten's paw, for which reason they are commonly called "pussy willows" in the North.

The habitats of our shrubby willow (or willows) are hard to classify, but the plants seem to prefer slightly damp places exposed to the sun, and are often found in unnatural places like railroad rights-of-way and edges of fields. The following are the recorded localities.

1A. Barrens of Lauderdale County (Mohr).
2B. Near South Lowell, Walker County.
3. West of Piedmont, Calhoun County (a locality where several prairie plants have been seen from trains). Near Zuber, Talladega County.
4. Near Hollins, Clay County.
8. Barbour, Pike and Lowndes Counties.
10W. Dr. Mohr reports *S. cordata* Muhl. from the banks of Muscle (Mussel?) Creek in Butler County.

A shrubby species which may be different from this grows on the steep face of House Bluff on the Alabama River in Autauga County.

POPULUS, L. The Poplars (of the Old World) and Cottonwoods.

Populus deltoide(s), Marshall. Cottonwood.

The nomenclature of this is somewhat unsettled. It has been called at various times *P. monilifera*, *P. angulata*, and *P. Virginiana*, and Prof. Sargent claims that the name *P. balsamifera* L., long applied to the northern "Balm of Gilead" tree, belongs to this species or a near relative of it. (Jour. Arnold Arboretum, 1:62-63. 1919.) We may have more than one variety, but if so they all look very much alike.

A tall tree, often two feet or more in diameter, with straight erect trunk, and brownish furrowed bark. As in the case of its cousin the common willow, the flower tassels appear in early spring, and the seeds ripen a few weeks later. The wood is light and soft, not much used in Alabama, but elsewhere converted into paper pulp, light boxes, excelsior, and fuel. This species and its varieties and hybrids are often planted for shade trees, but have

little to recommend them except rapid growth. Three varieties of it are known to the horticultural trade, and two wild varieties have been described. The "Carolina poplar" (*P. Eugenei*) is believed to be a hybrid of European origin, between *P. deltoides* and the Lombardy poplar (*P. nigra Italica*).

References: Williamson.

Grows on the banks of the large muddy rivers where they are subject to considerable fluctuation, and also along creeks, branches and ditches in calcareous regions. Its distribution by regions is about as follows:

1B. Along the Tennessee River all the way across the state. Reid's Gap, Blount County (perhaps not native).
2B. Extends up the Warrior River a few miles above Tuscaloosa.
3. Along the Coosa River near Gadsden and the Cahaba in Bibb County.
6A. Along the Warrior, Cahaba and Tallapoosa Rivers.
6C. Common on the Alabama River, less so on the Warrior.
7. Common on rivers and creeks and even along ditches between fields.
8. Nearly as common as in the black belt, in similar situations.
9. On rivers and creeks. Sumter, Marengo and Wilcox Counties.
10E. On Conecuh and Pea Rivers, Pike County.
10W. Common on rivers and larger creeks, and occasionally along small creeks and ditches.
11. Frequent along rivers and creeks.
14. Upper part of the delta.

Populus heterophylla, L.

A smaller tree than the preceding, not large or abundant enough in Alabama to be of any importance.

Dr. Mohr reported this from Montgomery and Clarke Counties, and Prof. Cocks reported two or three trees in Dallas County, but I have seen it in Alabama only in the lower part of the Mobile delta, where it is common but not abundant. (It also grows in similar situations along the Apalachicola River in Florida.)

Populus alba, L. (European) White Poplar.

A small to medium-sized tree, with whitish bark covered with something that rubs off like chalk, and small coarsely toothed leaves dark green above and white-downy beneath.

A native of Europe, cultivated for ornament and shade, but not very desirable because it sends up suckers from the roots. Runs wild in the northern parts of the state, and near Tuscaloosa, Mobile, and doubtless other places.

CORYLACEAE. Hazel-nut family.

Includes four genera and about 50 species, trees and shrubs, mostly in the north temperate zone.

CARPINUS, Linnaeus.

Carpinus Caroliniana, Walt. Ironwood.

A small tree, rarely more than a foot in diameter and 30 feet tall,* with trunk somewhat fluted—never perfectly round—and smooth grayish bark a little darker than that of the beech. Blooms in spring, just before the leaves unfold. The wood is heavier than water when green, but is seldom used for anything in Alabama. Elsewhere it is sometimes made into tool-handles, etc. The tree is said to be good for border screens and tall hedges.

Grows mostly in creek bottoms. Rare in region 2A, and apparently wanting in 13, 14 and 15, but common elsewhere.

OSTRYA, Scopoli.

Ostrya Virginiana (Mill.) Willd. (Hop Hornbeam).

Very similar to the preceding in size, leaves, flowers, and time of blooming, but has a brown finely furrowed and somewhat fibrous bark, and a fruit something like hops.

This makes a good ornamental tree, and is occasionally planted in parks, etc. The wood is heavy, strong and durable, much like hickory, and is used in some places for posts, levers, cogs, wedges, handles, and the like. The bark is sometimes used medicinally, though not officinal.

Grows naturally on bluffs and in ravines and hammocks, where it is pretty well protected from fire. Common in regions 2B, 10W and 11, and frequent in most of the others, but in 13 known only from near the Conecuh River southeast of Brewton, and rare or wanting in 4, 6B, 8, 9, 14 and 15.

CORYLUS, L. The Hazel-nuts (Filberts of Europe)

The only nut-bearing shrubs in our flora, except one or two chinquapins and oaks. Both the American species, *C. Americana*

*I have seen a tree 15 inches in diameter on the Sipsey River near Fayette, and one about 40 feet tall at Meriweather's Landing on the Warrior River in Greene County.

Walt. and *C. rostrata* Ait., occur in Alabama, and they are perfectly distinct, but hard to tell apart without the fruit, which can be seen only in late summer and fall, and is rare with us, so that I have never seen any in this state. The shrubs are sometimes planted for borders and hedges, and their nuts are quite a delicacy.

The hazel-nuts grow in dry or moderately rich woods, not often burned over, and are apparently confined to the hill country. In the following statement of local distribution the two species are combined, on account of the difficulty of distinguishing them; but *C. rostrata* is probably the commoner of the two.

1A. Dry woods northwest of Florence. *(C. Americana?).*
2A. Near Albertville and Cullman *(C. Americana?),* and common on Lookout Mountain near Mentone. (*C. rostrata?*). Roadsides in Blount County northeast of Bangor.
2B. Tuscaloosa County (E. A. Smith). *(C. rostrata?).*
3. Near Pratt's Ferry, Bibb County.
5. Cleburne (E. A. Smith, *C. Americana*), Clay, Randolph (Mohr) and Tallapoosa Counties. *(C. rostrata?).*

BETULACEAE. Birch Family.

Two genera and about 100 species, trees and shrubs, mostly in the north temperate zone.

BETULA, Linnaeus. The Birches.

Betula nigra, L. (Common, red, or river) Birch.

A medium-sized tree, with trunk seldom more than two feet in diameter, usually leaning toward the water. Bark peeling off in shaggy flakes with horizontal grain, but not in large enough pieces to make canoes and fancy articles out of like the northern paper birch. The flower tassels appear before the leaves in spring, and the seeds ripen in a few weeks, as in the case of the willows and cottonwoods.

This species is sometimes cultivated in parks and lawns. Very little of the wood is cut in Alabama, but it is used in some places for furniture, crates, ox-yokes, pump-handles and hoops, and it makes good fuel, like most other hardwoods.

References: Maxwell.

Grows along rivers and creeks, like the willow, but it is not usually as abundant as that, or found on such small streams. Common throughout the state outside of the principal long-leaf pine regions. Rare or absent in regions 4 and 6B, in 12 known

only from the Choctawhatchee River near Geneva (but to be expected also on the Pea and Chattahoochee), and in 13 from Burnt Corn Creek and the Conecuh River near Brewton.

Betula lenta, L. (Cherry, or Black) Birch.

In Alabama usually a small tree, scarcely more than a shrub, but Mr. Harbison found it growing to considerable size in a gorge in Jackson County. Farther north, where it is commoner and larger, the wood is used for furniture and various other purposes. An oil, similar to if not identical with oil of wintergreen, is distilled from the bark and twigs, in the mountains of North Carolina and elsewhere, and a kind of beer is said to have been made from the fermented sap of the tree. This species is also cultivated to some extent for ornament.

This species seems to grow only in places pretty well protected from fire. In Alabama it is found mostly on sandstone cliffs at tops of mountains.

2A. "Winston County, rocky banks of Sipsey Fork, 1,600 feet"* above sea-level (Mohr). Gorge on northwest side of Sand Mountain near Pisgah, Jackson County (Harbison). Northern brow of Chandler Mountain, St. Clair County.

4. Rocky summits of the Blue Ridge, Cleburne, Clay and Talladega Counties.

ALNUS, Gaertner. The Alders.

Alnus rugosa (DuRoi) Koch. (*A. serrulata*, Ait.) (Common) Alder.

A common large deciduous shrub, blooming in January and February, being one of our earliest spring flowers. The stems are sometimes three or four inches in diameter, and have been used for fuel and charcoal. The bark has astringent properties, and is sometimes used in dyeing, and for diarrhoea and impurities of the blood. The shrub is recommended for planting along streams on private estates, and can be bought from some northern nurserymen.

Grows mostly along branches and creeks, not much along rivers except where they are small and do not fluctuate much, or where spring water seeps out along their banks. It is probably

*This altitude seems to be considerably exaggerated, but there are no topographic maps of Winston County yet, except the extreme southern edge.

the commonest shrub in the state. It seems to avoid the richest and poorest soils, and extremes of lime, mud and sand. It is rare in regions 1A and 1B, and not recorded from 9, 14 and 15. On a trip down the Warrior and Tombigbee Rivers from Tusculoosa to Jackson in 1908 I did not see it at all after passing out of the Cretaceous regions. (See Bull. Torrey Bot. Club 37:117. 1910.)

CUPULIFERAE (or FAGACEAE). Oak Family.

About 6 genera and 600 species, mostly trees, and mostly in the north temperate zone. Chiefly valuable for their wood, but some have edible nuts, and some yield dye, tanning materials, cork, etc., and many are cultivated for shade or ornament.

FAGUS, Linnaeus. The Beeches.

Fagus grandifolia, Ehrh. (*F. ferruginea* Ait., *F. Americana* Sweet, *F. atropunicea* Sudw.) (American) Beech.

(Fig. 27)

(Our tree is supposed to differ a little from the northern one, and it has been named var. *Caroliniana* by Fernald and Rehder, but the supposed differences are not conspicuous.)

A well-known medium-sized to large tree, with trunk strictly erect, and often two or three feet in diameter. The bark is smooth and gray, never furrowed, and near towns it is often hard to find trees without initials cut in them. It makes a fine lawn and park tree, and some of the largest specimens are found around old country estates. The wood is hard and strong, but difficult to season and not very durable, so that its uses are limited. It is very little used in Alabama, but elsewhere it is said to be used for boxes, wheelbarrows, pump-handles, saw handles, brush handles, chairs, planes, bobbins, clothes-pins, faucets, blocks for half-tone plates, mouse-traps, shoe-lasts, and sometimes flooring. The bark and leaves are medicinal, but not officinal. The bark has also been used to some extent for tanning. The nuts are edible, but in most years the greater part of the crop seems to be sterile and empty. An oil can be extracted from them.

References: Maxwell.

The beech grows in ravines, hammocks, bluffs and bottoms, mostly in non-calcareous soil, protected from fire, and nearly always in virgin forests with plenty of humus. Its exact habitat

Fig. 27. Beech forest in bottoms of Flint Creek about three miles north of Hartselle, Morgan County. March 13, 1913. (The large tree in the center is a sweet gum.)

preferences are not fully understood yet, but it seems likely that certain conditions of the soil fauna and flora are essential, perhaps the absence of earthworms and the presence of certain fungi. It is found in every region except 14 and 15, but is rare in 4, 6B and 13. It is probably most abundant in 2B, where it may make up as much as 3% of the forest.

CASTANEA, Adanson. The Chestnuts and Chinquapins.

Castanea dentata (Marsh.) Borkh. (*C. Americana* (Mx.) Raf.) Chestnut.

One of our larger trees, and one of the few which blooms in midsummer. Differs from most of those previously mentioned in being pollinated by insects. Although not very abundant in Alabama, this is one of our most useful trees. It is sometimes planted for ornament and shade in lawns and parks. The wood is weak and coarse-grained, but very durable, and therefore in demand for telegraph poles, fence-rails and posts, and more rarely for crossties and shingles. In some regions where it is abundant it has been made into furniture and interior finish, but it seems to have no special merit for those purposes except ease of working. It burns well, but is not desirable for open fireplaces, because it is contin-

ually throwing off sparks. An extract from the wood has come into use in recent years for tanning, and large quantities of chestnut are cut in the mountains of North Carolina for that purpose. An infusion of the dried leaves has been used in the treatment of whooping cough and similar ailments. The nuts are produced in abundance, and constitute an important article of food, especially for the small boy. (The European chestnut, which is not very different from ours, is cultivated extensively in southern Europe for its nuts, many of which are shipped to this country.)

References: Ashe 1. Also "Nut culture in the United States," referred to a few pages back, under *Hicoria Pecan.*

The chestnut grows in rather dry non-calcareous woods, especially on rocky slopes among the mountains. It seems to be moderately tolerant of fire, but probably does not thrive where earthworms are present. It is nowhere abundant in Alabama, but was doubtless more so originally. It has several enemies and diseases, and perfectly sound trees are rare. There is abundant testimony to the effect that it has been dying out all over the South for three-quarters of a century or more. In northwestern Alabama its decline is said by the inhabitants there to have begun with a late freeze in May, 1854, which killed all the chestnut trees over considerable areas.* In Georgia the beginning of the trouble has been placed by some as far back as 1840, and in South Carolina even earlier.† The dying of the chestnut in some parts of New York and North Carolina has been ascribed to a fungus, *Armillaria mellea,* which also attacks oaks;‡ and the same thing may have happened in Alabama. About 1905 a very virulent fungous disease

*B. L. C. Wailes, in a report on the geology of Mississippi, published in 1854 (pp. 352, 354), stated that the chestnut ranged south to latitude 31° in Marion County, but had become diseased and was rapidly dying out. Miss Caroline Rumbold, in a communication entitled "A new record for a chestnut tree disease in Mississippi" (Science II. 34:917. Dec. 29, 1911) says Dr. E. W. Hilgard found all the chestnut trees in northeastern Mississippi dead in 1856. (But the species must have come back to a considerable extent since then, for it is still found there.) Dr. A. W. Chapman, in his Flora of the Southern United States, 1860, gave the range of this species as "West Florida and northward"; but there seems to be now no authentic record of its occurrence in a wild state within forty miles of Florida. (Prof. Sargent, in his latest Manual of North American Trees, extends its range to Crestview, Fla., but that record may have been based on a cultivated or old field specimen.) For notes on the dying out of the chestnut in Alabama see Mohr's Plant Life, pp. 14 (footnote), 61, 70, 468.

†See H. Hammond, South Carolina (handbook), p. 146, 1883.

‡See W. H. Long, U. S. Dept. Agric. Bull. 89. 1914.

of the chestnut (*Endothia parasitica*, chestnut canker) appeared in New York City, and it has since spread out several hundred miles from there, killing most of the trees in its path, but it does not seem to have reached Alabama yet.§

Although the chestnut is now rather scarce in southern Alabama, large solitary and fairly healthy specimens of it in fields and along roadsides are not uncommon in that part of the state, and it is difficult to decide whether they are remnants of the original forest or have been planted. The known distribution of native trees is about as follows:

1A. Common on cherty hills near Tennessee River, in Lauderdale and Colbert Counties.

1B. Cherty soils, Madison and Marshall Counties.

1C. Colbert and Lawrence Counties; not common. Near Johnson's Landing, Morgan County.

2A. Frequent in most of the counties, making perhaps 2% of the forest, especially eastward. Not common in Winston County.

2B. St. Clair, Tuscaloosa and Bibb Counties; rather rare.

3. Chert and sandstone ridges, Etowah, Jefferson, Shelby and Bibb Counties.

4. Rather common throughout.

5. Cleburne, Randolph and Tallapoosa Counties; not common.

6A. Franklin, Fayette, Tuscaloosa, Bibb and Hale Counties; rather rare.

6B. Tuscaloosa and Bibb Counties.

6C. Hills near Prattville and McQueen, Autauga County.

7. Formerly common near Sardis, Dallas County (Cocks).

8. Along Chunnennuggee Ridge east of Union Springs.

10E. Pike and Coffee Counties; rare. Henry County (Sargent).

11(?). On north-facing escarpment at edge of pine hills a few miles south of Monroeville, in about latitude 31° 30'.

---

§For notes on the chestnut canker and its effects see the following papers:

H. Metcalf & J. F. Collins. The present status of the chestnut bark disease.—U. S. Bur. Plant Industry, Bull. 141, part 5. Pp. 43-54, fig. 2, pl. 4. 1909.

(Same). The control of the chestnut bark disease.—U. S. Dept. Agric., Farmers' Bull. 467. 24 pp., 4 figs. 1911.

(Same). The present known distribution of the chestnut bark disease. —Science II. 35:420-421. March 15, 1912. (See also pp. 985-986 of the same volume.)

Haven Metcalf. The chestnut bark disease.—U. S. Dept. Agric., Yearbook 1912:363-372, pl. 34-37. 1913.

A. H. Graves. The future of the chestnut tree in North America.—Pop. Sci. Monthly, 84:551-566, 4 text-figs. June, 1914.

J. C. Nellis. Uses for chestnut timber killed by the bark disease.—U. S. Dept. Agric., Farmers' Bull. 582. 24 pp., 8 figs. 1914.

E. R. Hodson. Is American chestnut developing immunity to the blight?—Jour. Forestry, 18:693-700. Nov. 1920. (Contains a short bibliography.)

G. F. Gravatt & R. P. Marshall. Chestnut blight in the southern Appalachians.—U. S. Dept. Agric. Circ. 370. 11 pp., 2 text-figs., 10 plates. 1926.

Castanea pumila (L.) Mill. CHINQUAPIN.

A large shrub or small tree, similar to the chestnut except in size, and in having the leaves pale beneath. Blooms in May. Too small and scattered to be of any value for its wood, but the nuts are edible, like those of the chestnut. It may be subject to some of the same diseases as the chestnut, for large healthy specimens are rare.

Grows in dry woods; widely distributed over the state, but nowhere common.

2A. On Lookout Mountain; rare.
2B. Near Holt, Tuscaloosa County.
4. Cedar Mountain, Clay County.
6A. Near Tuscaloosa.
6C. Greene, Perry, Autauga and Montgomery Counties.
7. Hatcher's Bluff on Alabama River, Dallas County.
8. Russell County.
10E. Dale and Coffee Counties.
10W. Choctaw and Wilcox Counties.
11. Near Souwilpa, Choctaw County.
13. Near Stockton and Silver Hill, Baldwin County, and in northeastern part of Mobile County.

One or two other chinquapins, recently described, have been credited to Alabama, but they are not well understood.

QUERCUS, Linnaeus. THE OAKS.

Alabama, like most other eastern states, has more species of *Quercus* than of any other genus of trees (except *Crataegus*, the haws, and most of those are recently described and doubtfully distinct, and too small to interest a forester.) About thirty species and a few varieties and hybrids have been credited to this state, but the number cannot be given exactly, because a few of them are not easily distinguished, and there are differences of opinion about them.

Most of our oaks are full-sized trees, large enough for saw timber, but some are small and scrubby, and two or three shrubs. Besides the true species several natural hybrids are known, these being usually easily recognized by the fact that they are as a rule solitary specimens growing in the immediate vicinity of the two supposed parents and intermediate between them in nearly all characters. No hybrids between the two great groups mentioned in the next paragraph are known.

The oaks of eastern North America have been divided into two large groups, which have been given the subgeneric names of *Leucobalanus* (white oaks) and *Melanobalanus* (black oaks). Those of the first group have pale soft bark (except *Q. montana*), leaves usually with rounded lobes, and more or less edible acorns maturing in one year; while the others are characterized by dark, hard (usually rough) bark, less valuable wood, leaves with their ends (and lobes, if any) bristle-tipped, and bitter acorns ripening the second year.

The first group can be further divided into three sections, the white and post oaks, with lobed (or in a few species nearly entire) leaves, the chestnut oaks, with sinuate-toothed many-veined leaves suggesting those of the chestnut (whence the name), and the live oaks, usually with small entire evergreen leaves. (One or two of the last, however, have coarsely toothed leaves suggesting the black oak group.) The black group is further divided into the red and black oaks, with large lobed deciduous leaves, and the water and willow oaks, most of which have narrow leaves (evergreen or nearly so in some species), smoothish bark, and small acorns.

WHITE AND POST OAKS

Quercus alba, L. WHITE OAK.

A large, common, and well-known tree, probably the most important of all our oaks. It is recommended as one of the best for planting in lawns and parks. The wood has almost every desirable quality, such as durability, strength, elasticity, and straight grain. Logs of it are hewn into cross-ties, and small poles used for levers, wagon-standards, etc. Large sawed timbers make strong beams for bridges, houses and ships. Smaller stiff pieces enter into the construction of the best furniture, book-cases, parts of cotton presses and various other machines, felloes and other parts of vehicles, barrel-heads, and interior finish. Its toughness and elasticity make it the best available wood for staves, hoops, and home-made cotton baskets. In Circular 53 of the U. S. Forest Service (January, 1907), is this interesting statement: "An industry more completely dependent upon one species of timber than is tight cooperage would be difficult to find. Tight cooperage depends upon white oak, and white oak of good quality."

Its fuel value is pretty high, too. A decoction of the inner bark of young trees (the *Quercus* of the U. S. Pharmacopoeia) has astringent properties, and is employed in the treatment of dysentery, etc. The bark has also been used for tanning, but is not considered as good for that purpose as that of some of the other oaks. Finally, the acorns are excellent food for hogs, and can be eaten by mankind.

References: U. S. Forest Service Circulars 53, 105, 106.

The white oak is common in woods, in all but the sandiest, rockiest and muddiest places, in nearly all parts of the state, especially in the northern half. It is often associated with the beech. It forms from about one to three percent of the forest in regions 1 to 11, but is rare in 12 and 13, and unknown in 14 and 15.

It apparently hybridizes occasionally with *Quercus montana* (which see).

Quercus stellata, Wang. (*Q. obtusiloba* Mx.; *Q. minor* (Marsh.) Sarg.) Post Oak.

Resembles the preceding in general appearance, distribution, and economic properties, but is usually a smaller tree. The wood does not make quite such good lumber as the white oak, but it seems to be a little more durable. Chiefly for this reason it is used more for cross-ties than anything else (and more than any other oak in this part of the country), especially in regions where long-leaf pine is scarce or absent. It is also used for fence-posts, as its name implies. At Athens and probably elsewhere it has been sawed into staves, but it is regarded as inferior to white oak for that purpose.

Grows mostly in dry woods and flatwoods, with more or less clayey soil. Constitutes from one to five percent of the forest in regions 1 to 6 and 8, about 6% in 7, 8% in 9, and 1% in 10 and 11, but is rare farther south, where *Quercus Margaretta* mostly takes its place.

It hybridizes with *Quercus montana* (which see).

Quercus Boyntoni, Beadle (Biltmore Bot. Studies, 7:47-48. 1901), described from the south end of Lookout Mountain, in Etowah County, seems to be only a dwarf form of this, or perhaps of the next species.

Quercus Margaretta, Ashe. (Sand-hill) Post Oak.

Similar to *Quercus stellata,* and perhaps only a variety of it (as it was originally described, and is still regarded by some authors), but differs in being smaller, with trunk usually not more than six or eight inches in diameter, and having paler and smaller and less deeply lobed leaves. Too small to be of any economic importance.

Grows usually in dry sandy soils, with long-leaf pine, in the coastal plain.

6B. Occasional, from a little west of the Warrior River to Elmore County.
7. Common in a sandy area near the Alabama River opposite Selma.
10E. Pike, Coffee and Dale Counties, especially the latter.
12. Geneva County.
13. Occasional as far south as Bay Minette. Rare west of the Mobile delta.

A single sturdy specimen of *Quercus macrocarpa,* Mx. (bur oak), fruiting abundantly, was pointed out to me by Mr. J. Haygood Paterson, in October, 1927, in a calcareous field or pasture in the black belt about a mile and a half northwest of Snowdoun, Montgomery Co. Its principal range is the upper Mississippi Valley and east to New York and south to Texas, and it is not supposed to grow naturally in Alabama at all. But the environment of this specimen is much like that of many in Illinois and adjoining states at the present time, and it is barely possible that it is indigenous, as the pecans in the same belt farther west (mentioned on a preceding page) are supposed to be. If a few other trees could be found the case would be much stronger.

Quercus lyrata, Walt. Swamp Post Oak. (Overcup Oak.)

This tree looks much like the common post oak in winter, but is usually larger, with leaves smooth and green on both sides (or occasionally whitish beneath) and differently shaped, and its acorns are considerably larger, and differ from those of all our other oaks in being usually almost completely enclosed in their cups, so that they cannot fall out.

Occasionally cultivated for ornament or shade. Its wood is much like that of the white and post oaks, and may be occasionally marketed with them, but there is not enough of it to be of much commercial importance.

Grows mostly in low flatwoods, alluvial bottoms, and second-bottom sloughs, where the water does not fluctuate more than ten or fifteen feet with the seasons. Not usually found on the immediate banks of streams. It is nowhere abundant, but seems to be commonest in the Eutaw belt (region 6C). Outside of Alabama and Georgia it seems to be confined to the coastal plain, but here it is more widely distributed, as follows:

1B. Along Limestone Creek in the southwestern part of Limestone County, and in flatwoods in southern Madison and western Morgan. One tree observed near Leighton, Colbert County.
1C. Along Cotaco Creek, Morgan County.
3. Cherokee, Calhoun and Jefferson Counties.
5. (Grows along the Tallapoosa River in Georgia, and probably in Alabama also, if it has not been drowned out by power dams.)
6A. Pickens and Tuscaloosa Counties, mostly in second-bottom sloughs high above the rivers.
6C. Common along the Warrior and Alabama Rivers.
7. Common along rivers and creeks.
8. Bullock, Barbour, Pike, Crenshaw and Wilcox Counties.
10E. Crenshaw, Coffee and Dale Counties.
10W. Sumter, Marengo, Wilcox and Butler Counties.
11. Conecuh County.
13. Along Conecuh River in Escambia County.
14. Upper part of the delta.

Quercus Durandii, Buckley. (*Q. breviloba* (Torr.) Sarg., in part). PIN OAK.

This comparatively rare tree has bark and wood much like the white and post oaks, but leaves and acorns often resembling those of the water oak, so that it is liable to be mistaken for that species in the herbarium. It is usually a small or medium-sized tree, but may attain a diameter of two feet. According to Dr. Mohr its wood was once used in the black belt for spools and cotton-gin pins, as well as for fuel.

References:—Buckley 1, Mohr 4, 15.

Grows mostly in calcareous or potassic soils, dry or damp.

1B. On limestone between Falkville and Somerville, Morgan County. Common on limestone slopes near Blount Springs. North slope of Warnock Mountain.
2B. On shale cliffs near Warrior River six to ten miles above Tuscaloosa. (Largest specimen seen there about 16 inches by 60 feet.) Bluffs of Turkey Creek near Fedora, Jefferson County.
3. Blount County (?), and near Bessemer. Pratt's Ferry, Bibb County. (E. A. Smith), on limestone.
7. Sumter, Greene, Hale, Perry and Dallas Counties.
8. Dallas and Wilcox Counties.
10W. Discovered in eastern Wilcox County by Buckley in 1859, and seen in the same neighborhood by the writer in 1922.
11. Choctaw and Clarke Counties.

Quercus austrina, Small, is a doubtful species, based on several different specimens, including some collected by Dr. Mohr in southern Hale County, and apparently some referable to *Q. Durandii*. (See Sargent, Bot. Gaz. 65:435-436. 1918.) It has been reported from Dallas County by Cocks, and should be investigated further in the black belt.

CHESTNUT OAKS

Quercus montana, Willd. (*Q. Prinus monticola*, Mx.; *Q. Prinus* of most American authors.*) CHESTNUT OAK. MOUNTAIN OAK.

(Map 13)

A very distinct tree of medium size, with hard deeply furrowed but not rough bark, and large smooth acorns in thin cups. Like most of the other oaks, this is sometimes planted for a shade tree; and some of the cultivated specimens are larger than any in the forests. Its wood is often used for cross-ties and charcoal. The most valuable part of the tree, though, is the bark, which is used for tanning in preference to that of all other American oaks. In the tan-bark operations the rest of the tree is usually allowed to go to waste. The acorns are good forage for hogs.

References: Foster & Ashe.

Grows mostly on non-calcareous bluffs, cliffs, and rocky and gravelly slopes, especially in the mountains. (It was formerly supposed to be confined to the hill country, but several coastal plain stations are now known, in Virginia, Alabama and Mississippi.) It is often associated with the chestnut, which it somewhat resembles, and like the chestnut, it is probably more tolerant of fire than of earthworms.

1A. Rocky hills and bluffs near Tennessee River, Lauderdale and Colbert Counties.

1B. Occasional on limestone slopes, Morgan County.

1C. Common on a shelf of Hartselle sandstone with limestone above and below it, on Smithers Mountain, Madison County. (At that locality the trees have not been seen in leaf, but the bark looks a little different from the typical form.—See Monograph 8, Fig. 3.—It should be investigated in summer or fall.) Occasional on Little Mountain in Morgan, Lawrence and Colbert Counties.

2A-2B. Common throughout, on rocky slopes.

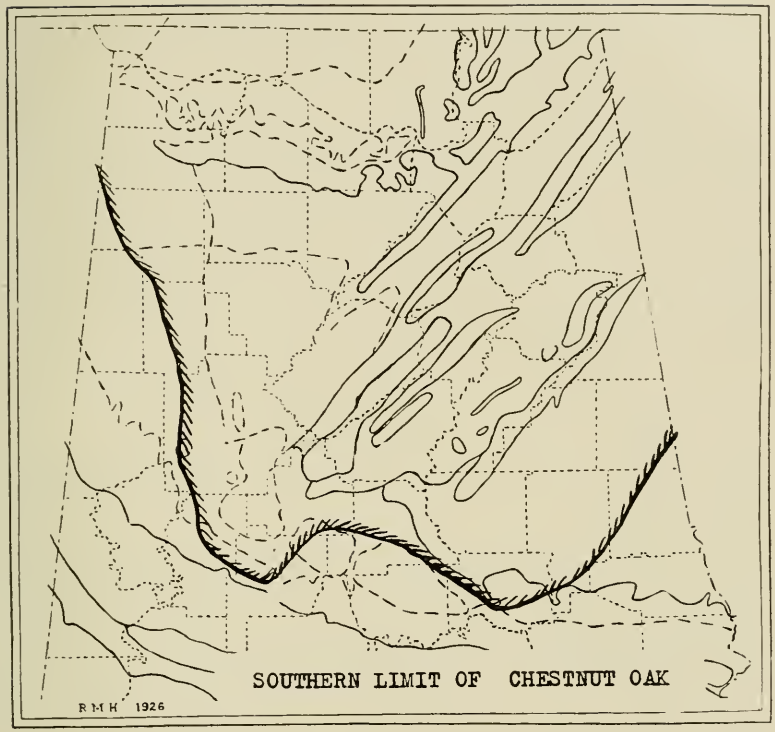
3. Frequent on chert and sandstone ridges.

4. Abundant on ridges and rocky slopes.

5. Frequent on rocky slopes, especially near the mountains. South to near Wetumpka and Tallassee.

6A. Gravelly ravines and bluffs; Franklin, Marion, Tuscaloosa, Hale and Chilton Counties. (Two feet in diameter and 75 feet tall near Havana.)

*See Sargent, Rhodora 17:40. 1915.



MAP 13. Southern limit of *Quercus montana*.

6B. Tuscaloosa, Hale and Bibb Counties.
6C. Heads of deep ravines south of Havana, Hale County, and a few miles north of Marion, Perry County.

Quercus Bernardiensis, Wolf (Torreya 18:161-162. 1918), described from Cullman County, is now believed by its author to be a hybrid between *Q. montana* and *Q. stellata*. I have seen what I took to be the same hybrid, in company with both parents, at the type-locality (1921), on rocky hills near the Warrior River about twelve miles above Tuscaloosa (1926), in a ravine between Maud and Trio, Bibb County (1924, and seen from train in subsequent years), and at Tallassee (1906).

What appears to be a hybrid between *Q. alba* and *Q. montana* (*Q. Saulei*, Schneider?) grows on a stratum of sandstone between limestones on the northwest slope of Lookout Mountain near Valley Head, DeKalb County.

Quercus Muhlenbergii, Engelm. (*Q. Castanea,* Willd.; *Q. acuminata* (Mx.) Sarg.) (Chinquapin Oak, or Yellow Oak.)

Resembles *Quercus montana* very much in foliage, but has soft bark like a white or post oak, and smaller acorns, which seem to be produced rather sparingly. Still more like *Q. Michauxii,* from which it is most easily distinguished (when acorns are not available) by its narrower leaves and drier habitat. The leaves on the lower part of the tree, however, may be almost exactly like those of *Q. Michauxii.* Its wood is probably similar to that of the related species, but it is too rare to be of much importance, and is perhaps not distinguished at all by the natives.

Grows mostly in rather dry calcareous or potassic soils.

1B. Frequent, especially on limestone slopes.
2A. Winston County, and southwestern Cullman.
2B. On shaly bluffs, Fayette, Walker and Tuscaloosa Counties. (Grows about a foot and a half in diameter and 60 feet tall on Hurricane Creek, Tuscaloosa County.)
3. Found in most of the counties, usually on limestone.
7. Chalk outcrops near Epes, Sumter County, south of Newbern, Hale County, and near House Bluff, Autauga County. Rare in Dallas County (Cocks).
10W. In a large area of limestone in eastern Wilcox County. (See Ecology, 1:201. 1920.)
11. On limestone along Salt Creek, Clarke County.
12. Limestone outcrop near Gordon, Houston County.

Quercus prinoides, Willd., a shrubby species similar to the preceding, is common in dry woods about two miles east of Montgomery (region 6C), but not known elsewhere in Alabama.

Quercus Michauxii, Nutt. (*Q. Prinus Michauxii* Chapm. Said by Sargent* to be the original *Q. Prinus* of Linnaeus.) Swamp Chestnut Oak. (Chestnut White Oak. Basket or Cow Oak.)

Commonly a large tree (often three feet in diameter), with bark like a white oak and leaves like a chestnut oak, as one of its common names implies. It seems to be adapted to every purpose that the white oak is, but is less abundant and therefore not so well known. For basket-making it is believed to be superior. The large acorns are said to have been roasted and eaten by the Indians, and they are good food for hogs.

*Rhodora, 17:40. 1915.

Most common in the coastal plain. In Alabama this grows mostly in river and creek bottoms, but in Florida it is commonly in low calcareous hammocks, which may be remote from large streams.

1A. Limestone County.
1B. Jackson, Madison and Morgan Counties. Said by Mohr to grow 4 feet in diameter and 116 feet tall in Blount County.
2B. Walker, Jefferson and Tuscaloosa Counties.
3. St. Clair, Talladega and Jefferson Counties.
5. Cleburne, Clay and Elmore Counties. Not common.
6A. Common from Lamar County southeastward.
7. In most of the counties.
8. Crenshaw and Pike Counties.
9. Sumter County.
10E. Crenshaw and Pike Counties.
10W, 11. Rather common.
15. Bayou la Batre, Mobile County (Mohr).

LIVE OAKS

Quercus Virginiana, Mill. (*Q. virens,* Ait.) LIVE OAK.

(Fig. 28)

Differs from all the oaks previously listed in being evergreen (whence its name), and in having smaller leaves, which are not lobed. It never grows very tall, but when old its branches are more widely extended than those of any other of our oaks, making a tree wider than high.

It is one of the favorite shade-trees for streets, parks, cemeteries, etc., in the regions where it is native, and is occasionally planted as far inland as Augusta, Ga., Montgomery, Ala., and Jackson, Miss. Its wood is very tough and heavy, and curved pieces cut from the junction of a limb and trunk were in great demand for ships' "knees," before the days of iron and steel vessels. It also has a limited use for mauls, rollers, etc. The bark is good for tanning, but is perhaps no longer used for that purpose.

The live oak ranges over a considerable area, with quite a variety of soils, in the southeastern states, and its essential environmental factors have never been fully determined. It seems to prefer a mild climate and a sunny situation, and calcareous or phosphatic soils, not too dry or too wet, and it seems to tolerate more salt and sulphur in the ground water than most trees do. It is not damaged much by fire, but (like several other evergreens) it probably does not have many earthworms around its roots in its

FIG. 28. *Quercus Virginiana* (with "Spanish moss") along small salt bayou at Coden, Mobile County. Photograph by Dr. E. A. Smith and R. S. Hodges, August 1, 1902.

natural habitats. Its distribution in Alabama is rather limited, as follows:

12. Edge of rich woods around a limestone cave in the southeastern part of Covington County. (Could probably be found also in Geneva and Houston.)
13. Around ponds a little south of Bay Minette.
15. Shores of Mobile Bay and connecting waters, near Coden, Daphne, Point Clear, Bon Secour, etc. (Doubtless also on the islands.)

Quercus geminata, Small. (Dwarf, or Scrub) Live Oak.

Differs from the preceding in being much smaller, sometimes hardly more than a shrub, with stiffer leaves strongly concave and white-woolly beneath. Although it is convenient to call it a distinct species, it might be more logical to treat it as a variety.* It is too small and scarce in Alabama to be of any importance.

Grows in sterile sandy soils, where fire is rather infrequent.

12. Dry sand along Double Bridges Creek and Pea River near Geneva.
13. Sandy places near the Mobile delta, in Washington and Mobile Counties. Southeast of Foley, Baldwin County.
15. Old dunes south of Orange Beach, Baldwin County (and doubtless on the islands of Mobile County, which I have not visited).

Quercus minima, Small. (*Q. virens dentata,* Chapm.)

A shrub, usually not more than knee-high, with tough evergreen leaves something like those of *Q. Virginiana,* but obscurely toothed, suggesting holly leaves.

This is common in the flat pine woods of Florida, but I have seen it only once in Alabama, in low pine lands near Fish River, between Silver Hill and Fairhope, Baldwin County.

Dr. Mohr reports *Quercus Virginiana maritima* (Mx.) Sargent from Navy Cove, Mobile County. That is a variety I have never identified, but it may be only a larger form of the preceding; or possibly he mistook *Q. geminata* (which was not described until 1897) for it.†

*For a discussion of the differences between our live oaks see Sargent, Bot. Gaz. 65:443-446. 1918.

†See Bull. Torrey Bot. Club, 32:465. 1905.

RED AND BLACK OAKS

Quercus falcata, Mx. (*Q. digitata* (Marsh.) Sudw.*) Red Oak. (Called "Spanish Oak" by many northern writers on trees.)

This tree is too well known to require any description. It is sometimes planted for shade (or left standing when the rest of the forest is cleared away), around farm-houses, and sometimes even in cities, and under such conditions often develops a trunk four or five feet in diameter; but in the forest, where it has to compete with trees of the same or other species, specimens more than two feet in diameter are exceptional. The wood, like that of most of the following oaks (black oak group), is coarse and not very durable. It makes an inferior quality of staves and furniture, but is used more for fuel, and in frontier settlements for fence-rails. The bark is probably the red-oak bark used by country people for poultices, etc., and occasionally for tanning.

Grows in dry woods, especially in ferruginous soils, and not usually in hammocks or other places well protected from fire. It is common in every region except 4, 14 and 15, where it is unknown, or at least rare.

The variety *triloba*, with three-lobed leaves, seems to be nothing but a juvenile form, which may be expected almost anywhere within the range of the species, especially in old fields.

Quercus Pagoda, Raf. (*Q. rubra pagodaefolia* (Ell.) Ashe) (Red Oak)

Sometimes treated as a variety of the preceding, from which it differs in having the leaves paler beneath, with shorter and more numerous lobes, and growing in damp soils.† As far as known its economic properties are similar to those of *Q. falcata*.

Grows mostly in alluvial bottoms of creeks and rivers.

1B. Creek bottoms west of Falkville, Morgan County.
3. Etowah, St. Clair, Jefferson and Talladega Counties.
6A. Occasional from Franklin County to Chilton County.
6C. Hale and Autauga Counties.
7. Sumter County to Lowndes County.
9. Sumter County.
10W. Wilcox, Marengo and Choctaw Counties.
11 (?). In Monroe County opposite Choctaw Bluff on the Alabama River.

*According to Prof. Sargent (Rhodora 17:39. 1915; 18:45-48, 1916) this is the original *Quercus rubra* of Linnaeus; but to take up that name, which for over 150 years was applied to a different tree, might be confusing to non-scientific readers.

†See Sargent, Bot. Gaz. 65:427-428. 1918. On the last-named page there is described another form, *Q. rubra leucophylla*, which may grow in Alabama too, but I have never distinguished it.

FIG. 29. *Quercus velutina*, with trunk about three feet in diameter, and a few leaves showing, on dry uplands about three miles northeast of Searles, Tuscaloosa County, June 4, 1913.

Quercus velutina, Lam. (*Q. tinctoria,* Bartr.) BLACK OAK.

(Fig. 29)

A tree intermediate in some respects between *Q. falcata* and the next, and not always easily distinguished at a glance. It is also somewhat variable. In the North what passes for this species usually has a pretty straight trunk and bark almost as smooth as that of the water oaks, while in the South it is inclined to grow crooked, and have rough bark. (Both forms seem to occur in the neighborhood of Washington, D. C.)

The wood is similar to that of the red oak. The bark ("quercitron bark" of the dispensatories) yields a yellow dye, and is also used in tanning. It was formerly officinal, and decoctions of it were used in the treatment of hemorrhage.

Grows in dry woods, especially in ferruginous soils and in mountainous regions, and does not seem to be particularly averse to fire.

1A. Colbert County.
1B. Colbert, Morgan and Madison Counties.
2A. Common; making about 3% of the forest.
2B. Frequent. Walker, Jefferson, Tuscaloosa and Shelby Counties.
3. Mostly on chert and sandstone ridges. DeKalb, Blount, Jefferson, and probably all the other counties.
4. Very common on dry slopes and ridges.
5. Frequent; about 1% of the forest.
6A. Occasional from Franklin County to Tuscaloosa County.
6B. Tuscaloosa and Autauga Counties.
6C. Greene and Autauga Counties.
7. Greene and Dallas Counties.
9. Sumter County; rather rare.
10E. Barbour, Pike and Coffee Counties.
10W. Wilcox, Butler and Monroe Counties.
11. Monroe County.

Quercus borealis maxima (Marsh.)* (*Q. rubra* of 19th century writers) (NORTHERN RED OAK. LEOPARD OAK.)

A stately tree, with large thin leaves, large acorns, and smoothish bark. The cups of the acorns are characteristic, being about an inch in diameter and very shallow. The wood is similar to that of the other red oaks. The bark is mentioned as a non-officinal drug in "Wild medicinal plants of the United States" (U. S. Bur. Plant

*This name was given almost simultaneously by Sargent (Rhodora 18:48) and Ashe (Proc. Soc. Am. Foresters 11:90) in March, 1916, and it may never be possible to decide which author got into print with it first. (See Torreya 17:135. 1917.)

Industry Bull. 89), but possibly it was confused with *Q. falcata* or *Q. velutina*. The tree is sometimes planted for shade, especially in the North.

Grows mostly in rich woods on cool shady slopes, not often burned over. When acorns were not available and I was traveling rapidly I may have sometimes confused it with *Q. velutina* or *Q. Schneckii*, but its distribution in Alabama seems to be about as follows:

1A. Hills near Riverton and south of Mussel Shoals, Colbert County.
2A. Lookout Mountain (Mohr). Blount and St. Clair Counties.
2B. Occasional in ravines.
3. DeKalb and Talladega Counties.
4. Lower slopes of mountains, Clay County.
5. Randolph, Chilton, Tallapoosa, and doubtless other counties.
6A. Scattered throughout.
7. Dallas County (Cocks).
10E. Coffee, Dale and Covington Counties.
10W. Sumter, Choctaw, Monroe and Butler Counties.
11. Choctaw and Clarke Counties.

Quercus Schneckii, Britton. (RED OAK?)

A tree somewhat intermediate between the preceding and the following species, and liable to tbe confused with one or the other in winter, or when one does not have time to examine closely, and I am not sure that I have always identified it correctly. It is also very closely related to *Q. Texana* and *Q. Shumardii*, which were originally described from Texas by Buckley.*

Grows mostly in calcareous soils, dry or damp, in fairly dense woods.

1B. Jackson, Madison, Morgan and Franklin Counties.
3. Etowah, St. Clair, Jefferson, Shelby, and probably most of the other counties.
7. Sumter, Greene, Hale, Dallas, Autauga, Montgomery and Macon Counties.
8. Dallas and Barbour Counties.
9. Sumter County.
10E. Dale County (perhaps *Q. coccinea?*)
10W. Marengo, Wilcox and Monroe Counties.
11. Clarke and Monroe Counties.
12. Near a limestone cave in southeastern corner of Covington County.

Quercus coccinea, Wang. SPANISH OAK. (SCARLET OAK of the books)

A neat-looking tree of medium size, with smoothish bark, and deeply lobed leaves which turn bright red in fall. Probably not well known or often used for any specific purpose in Alabama, but it makes a pretty shade-tree, if nothing else.

*See Sargent, Bot. Gaz. 65:424-426. 1918.

Grows in dry woods, in rather poor soils; commonest northward. In former years I may have sometimes confused it with *Q. Schneckii*, although the habitats of the two are usually quite different.

1A. Limestone and Colbert Counties.
1B. Near Athens and Stevenson (the latter perhaps *Q. Schneckii?*). Flatwoods north of Leighton.
1C. Lawrence and Colbert Counties.
2A. Very common, making probably nearly 3% of the forest.
2B. Frequent; less than 1%.
3. Scattered on dry ridges.
4. Pope Mountain, Talladega County. Blue Ridge near Erin, Clay County.
5. Clay and Chilton Counties, and probably most of the others.
6A. Common in Franklin and Marion Counties, less so southward.
6C. Autauga and Macon Counties.
7. Var. tuberculata reported from Dallas County by Cocks.
8. Barbour County.
9. Sumter County.
10E. Barbour, Dale(?), Coffee and Covington Counties.
10W. Choctaw and Conecuh Counties.
11. Choctaw County.

Quercus Catesbaei, Mx.

Turkey Oak. (Forked-leaf) Black-jack.

(Map 14, Fig. 30)

A small scrubby tree, rarely more than a foot in diameter, with hard rough blackish bark, and deeply lobed thick reticulated shining pale green leaves which are much alike on both sides, and turned at all sorts of angles to the horizon, so that they get about as much sunshine on one side as on the other. The leaves turn a brilliant red for a short time in the fall, and then brown, many of them remaining on the tree in that condition all winter, so that it is easily recognized at all seasons. The tree is hardly ever used for anything except fuel, but it serves very well for that, being usually of sizes easily cut.

Grows in very dry, usually sandy soils, but not in extremely sterile soils like the white sands along the coast. Almost confined to the coastal plain. Nearly always associated with the long leaf pine, and as indifferent to fire as that is.

5. Summit of Bald Knob near Wetumpka. (See Plant World 9:266. 1907.)
6B. Rather common throughout, extending to a few miles west of the Warrior River in Tuscaloosa County. Abundant in Autauga County.
6C. On gravelly hills and in sandy creek bottoms, Autauga County.
7. Sand in Dallas and Lowndes Counties.
8. Pike County.

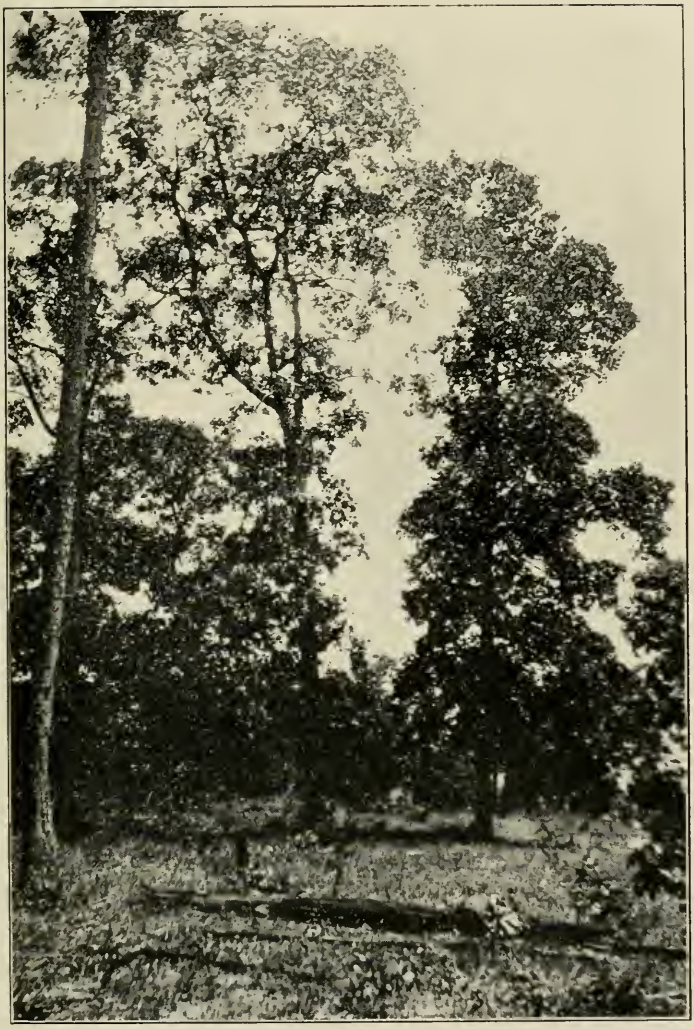
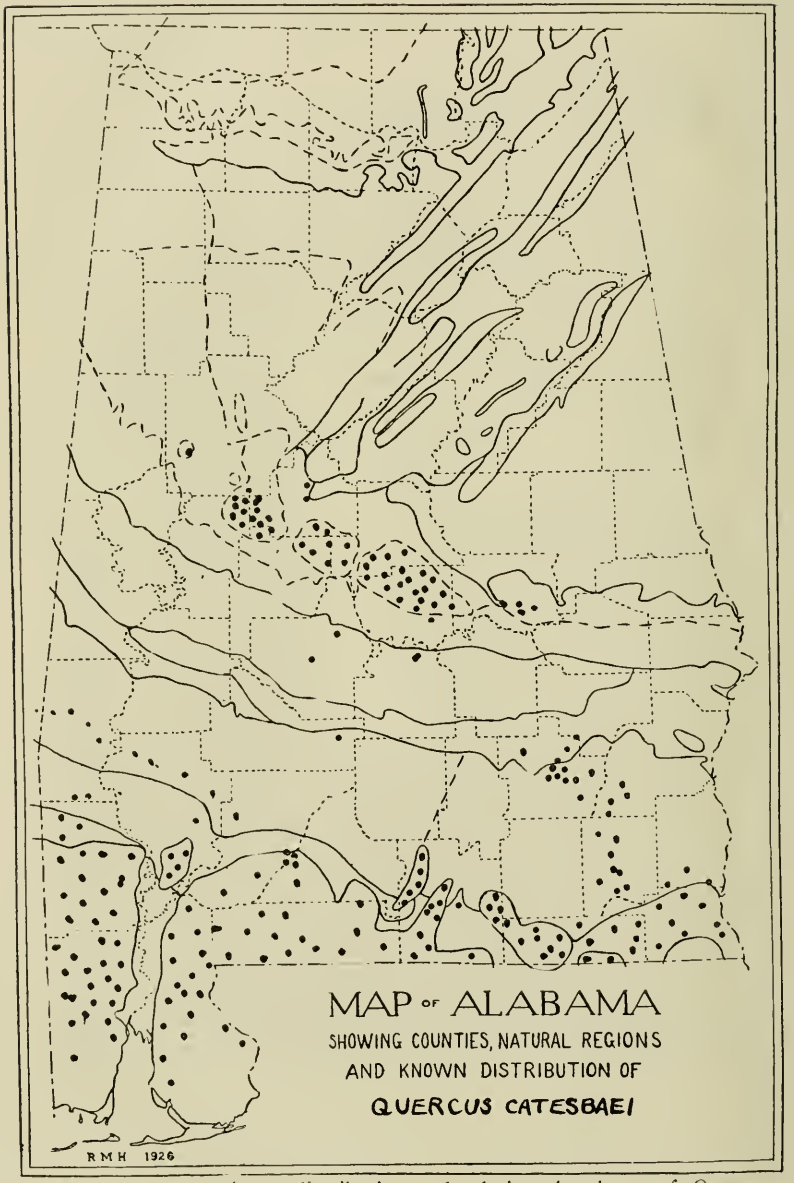


FIG. 30. *Quercus Catesbaei* on high pine hills northwest of Joffre (formerly Kingston station), Autauga County. June 29, 1927.



Map 14. Approximate distribution and relative abundance of *Quercus Catesbaei,* indicated by dots.

10E. Frequent, but not abundant except in Dale County.
10W. Rare, mostly on Buhrstone ridges. Wilcox, Monroe and Choctaw Counties.
11. Occasional on uplands, Choctaw, Clarke and Monroe Counties.
12. Common throughout.
13. Very common.

Quercus Marylandica, Muench. (*Q. nigra* of most 19th century authors. *Q. ferruginea,* Ait.)
(Round-leaf) Black-jack. (Dollar-leaf Oak)

(Fig. 31)

A well-known rugged-looking tree of medium size, ranging from scarcely more than a shrub to a foot or two in diameter. In late winter when its leaves are off it looks much like the other black-jack, *Q. Catesbaei.* Like that species, its principal use is for fuel.

If there is any tree that specially prefers ferruginous soils (a point not yet demonstrated, however), this is it. Its rusty-looking leaves and black bark suggest iron, and it grows especially on red clay hills, and in other very dry soils, but not in quite such poor soils as the preceding, though the two are often associated. It seems to be almost as indifferent to fire as *Q. Catesbaei* is.

1A. Limestone County.
1B. Frequent on the poorer uplands.
1C. Lawrence and Colbert Counties.
2A. Common nearly throughout, but said by W. Wolf to be absent from the vicinity of Cullman.
2B. Common.
3. Very common, especially on chert and sandstone ridges.
4. The most abundant deciduous tree.
5. Common throughout.
6A. Common on uplands.
6B. Very common.
6C. Frequent.
7. Common on the poorer soils, where the chalk is overlaid by red loam. Relatively more abundant since the deforestation of the richer soils.
8. Occasional in Dallas, Macon, Bullock, and perhaps other counties.
9. Marengo County.
10E. Common throughout.
10W. Frequent in all the counties.
11. Frequent.
12. Common.
13. Very common on loamy uplands.

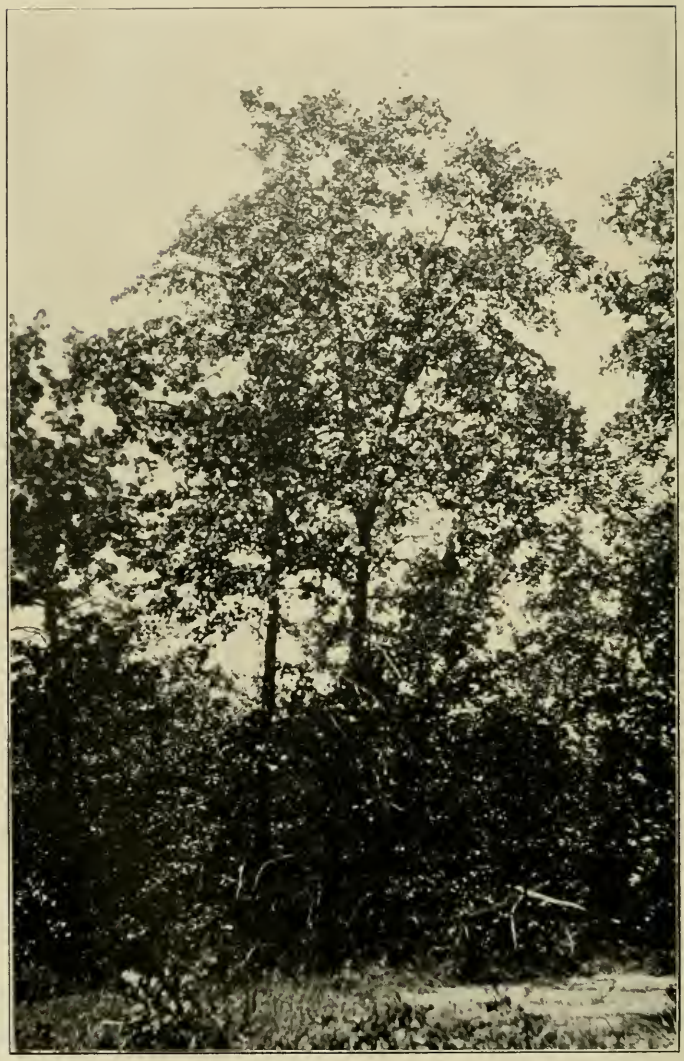


FIG. 31. *Quercus Marylandica* on high pine hills near center of Elmore County. July 22, 1927.

Two trees growing close together in a field on the farm of R. W. Shackelford, northeast of Autaugaville (region 6C), observed in fruit in the fall of 1927, seem to represent hybrids between this and *Q. falcata* and *Q. Catesbaei* respectively. Some oak stumps close by may represent one or more of the parent trees, but since they were cut the best evidence for identifying the hybrids (if such they are) is lost.

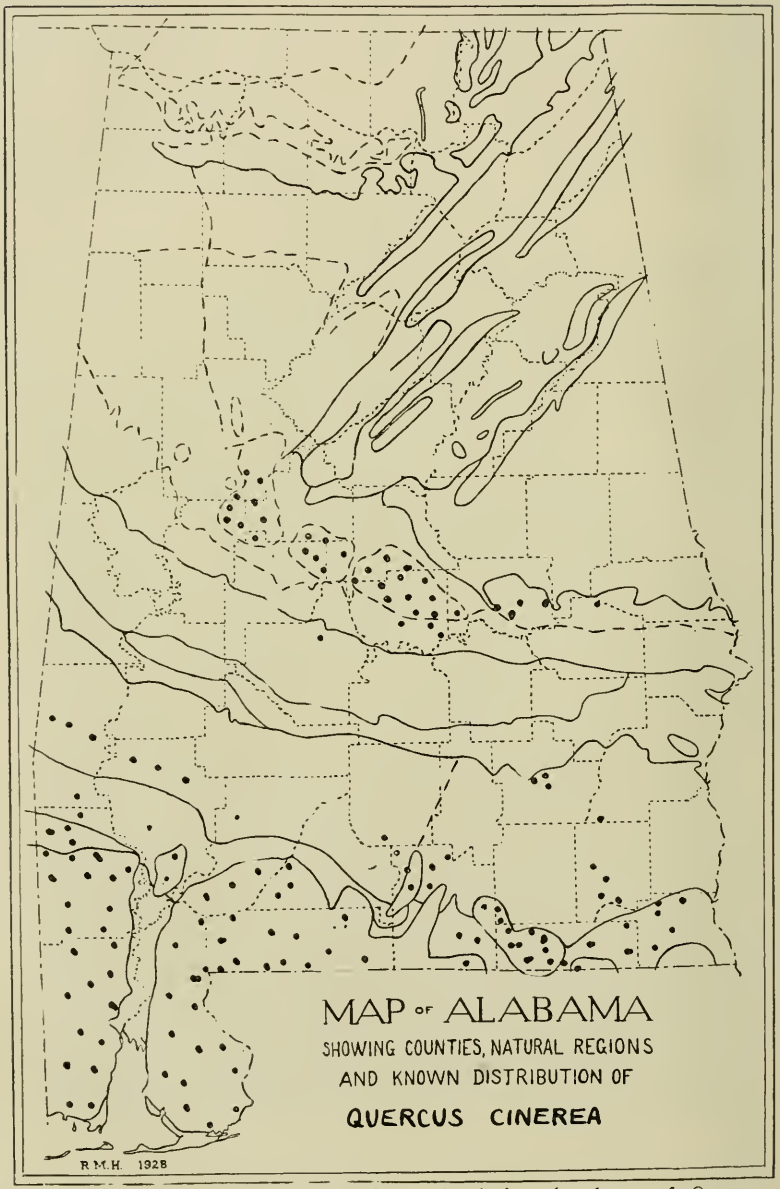
Quercus heterophylla, Mx. f. (Bartram Oak.)

This species, or hybrid, has been known for over 100 years, and reported from various places scattered from New York to Texas. It is supposed to be a hybrid between the willow oak and one of the red oaks, but its exact parentage has never been settled. A single specimen was found by Mohr and Sudworth near Falkville, in the Tennessee Valley, 35 or 40 years ago. (See Mohr, Bull. Torrey Bot. Club 19:309. 1892; Plant Life of Ala., 473.)

Quercus Nuttallii, Palmer (Jour. Arnold Arboretum, 8:52-54. 1927)

A medium-sized tree with the smoothest and greenest bark of any of our lobed-leaved oaks, thin deeply lobed leaves which are green on both sides, and medium-sized acorns. There are a few specimens of what appears to be this species planted for shade in the streets of Tuscaloosa.

At the time this was described it was known only from Mississippi, Arkansas, Louisiana, and perhaps Missouri. But I collected it the same year (1927) in the bottoms of Bughall Creek in Bullock County (region 7), and in the Mobile delta in Baldwin County opposite Mount Vernon (region 14), where it seems to be rather common; and I had previously seen what may be the same thing in alluvial situations in Tuscaloosa and Wilcox Counties. This may be what Dr. Mohr called *Quercus Texana* in the Plant Life of Alabama, and it may prove to be pretty widely distributed in the state.



Map 15. Approximate distribution and relative abundance of *Quercus cinerea*, indicated by dots.

WATER AND WILLOW OAKS.

Quercus cinerea, Mx. (*Q. brevifolia* (Lam.) Sarg.) TURKEY OAK. (HIGH-GROUND WILLOW OAK. NARROW-LEAVED BLACK-JACK. BLUE-JACK.)

(Map 15)

A small tree, seldom as much as a foot in diameter and 25 feet tall, with rough bark and narrow entire grayish leaves. The wood does not attain sufficient dimensions to be used for anything but fuel; but the bark is said to yield a fine yellow dye.

Its habitat and distribution are very similar to those of *Q. Catesbaei,* with which it is commonly associated, but it seems to prefer soils that are a trifle finer-grained or richer or more phosphatic, and it is less abundant, but ranges farther inland. It is chiefly confined to regions where less than one percent of the area was cultivated in cotton in 1880.

2A. A few small specimens of what appears to be this species grow near Noccalula Falls at the south end of Lookout Mountain, Etowah County.
2B. South Lowell, Walker County (Mohr).
5. Hills near Coosa and Tallapoosa Rivers, Chilton and Elmore Counties.
6A. Tuscaloosa County to Macon County; rather rare.
6B. Common on hills.
6C. Autauga, Elmore and Montgomery Counties.
7. In sand, Dallas County.
10E. Frequent.
10W. Choctaw, Monroe and Butler Counties.
11. Choctaw and Clarke Counties.
12. Common.
13. Common throughout.

Quercus Arkansana, Sargent. (*Q. Caput-rivuli,* Ashe?)

(Figs. 32-34)

A small tree, seldom exceeding a foot in diameter and thirty feet in height, with trunk usually a little crooked or leaning, and gray bark, remarkably smooth for an oak, and somewhat resembling the beech in that respect. The leaves are the largest known in the water-oak group, being sometimes four or five inches long and broad, wedge-shaped and obscurely three-lobed, much like those of *Q. Marylandica,* but thinner and nearly smooth. The flowers appear in March. The acorns are small, and scarcely distinguishable from those of the other water and willow oaks.

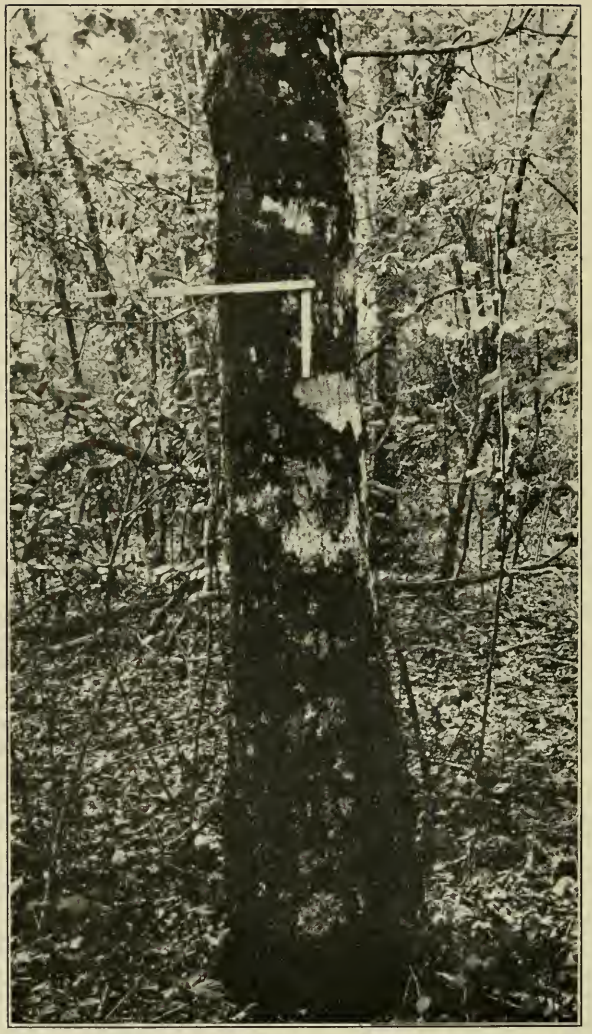


FIG. 32. Trunk of *Quercus Arkansana* (?), about a foot in diameter, in the "pocosin," Pike County. March 27, 1913.

FIG. 33. Branch of *Quercus Arkansana* (?), with young leaves and flowers. March 27, 1913.

Quercus Arkansana was originally described by Prof. Sargent* from Hempstead County, Arkansas. At the same time he mentioned a specimen of what appeared to be the same thing collected by Dr. Mohr on July 4, 1880, on the wooded banks of the Conecuh River in Conecuh County, Ala. [but the Conecuh River does not touch Conecuh County!]. My first specimens were collected in the "pocosin," a few miles east of Troy, on Nov. 6, 1912, and a trunk of one of the trees, photographed the following spring (March 27, 1913), was figured in the Bulletin of the Torreya Botanical Club 41:215, May, 1914. In January, 1920, Mr. J. O. Veatch found what is evidently the same thing in sandy hammocks in the southern part of Okaloosa County, Florida. In 1923 Mr. Ashe described his *Q. Caput-rivuli,* from West Florida, supposing it to be distinct from *Q. Arkansana,* but making no reference to my Alabama specimens. The specimens from east and west of the Mississippi River, with a gap of several hundred miles between them, seem to differ slightly, *Q. Arkansana* as originally figured having larger acorns than the Alabama tree; but for the present it seems best to treat them as all one species.

*Trees and Shrubs, 2:121-122, pl. 152. 1911.

FIG. 34. Leafy twigs and acorns of *Quercus Arkansana* (?), collected in the "pocosin", November 6, 1912, and photographed a few weeks later against a background ruled in inch squares.

Dr. Mohr indicated on the label of his Alabama specimen that he considered it a hybrid between *Quercus Marylandica* and *Q. nigra,* and similar views have been expressed by others about *Q. Arkansana.* But it does not usually associate with the other species named, and its only resemblance to *Q. Marylandica* is in the shape of its largest leaves. It differs too much from that in bark and acorns to be closely related to it. The question of hybridity has been discussed by Palmer in the paper cited in the bibliography. *Quercus Arkansana,* or what now passes for that in Alabama, seems to be a perfectly good species, related to *Q. nigra* and *Q. myrtifolia,* and it might be regarded by very conservative persons as a giant form of the latter.

Quercus myrtifolia, Willd. (*Q. Phellos arenaria,* Chapm; *Q. aquatica myrtifolia* A. DC.)

A large shrub, or occasionally a small tree, with small roundish stiff evergreen leaves concave below.

Grows in sterile sands; known in Alabama only from old dunes on the coast of Baldwin County. (Commoner in Florida, like its associate *Pinus clausa.*)

Quercus nigra, L. (*Q. aquatica* (Lam.) Walt.) WATER OAK.

A medium-sized tree with straight trunk, usually a foot or so in diameter, and rather smooth bark. It is variable in foliage, and not always easy to distinguish from related species. The narrow obscurely three-lobed leaves hang on and remain green part of the winter, but are usually nearly all gone before the new ones appear in the spring. It is one of the commonest shade-trees, in all the southeastern states. It is hardly used for anything else, except fuel.

Grows mostly near streams of all sizes, nearly throughout the state, below 1000 feet altitude. It often comes up like a weed in low clearings, but can hardly be called abundant anywhere. It is rare in the barrens and mountains, and not known in the lower part of the Mobile delta, but is common in regions 6C, 7, 8 and 9, where it seems to constitute about two percent of the present forest.

FIG. 35. Several specimens of *Quercus obtusa* in low pasture near Fort Deposit, Lowndes County. April 20, 1928. Many other oaks have about the same shape when not crowded by other trees, and this could hardly be distinguished from *Q. Phellos* at a little distance.

Quercus obtusa (Willd.) Ashe.* (*Q. rhombica*, Sarg.†)
(WATER OAK.)
(Fig. 35)

An imperfectly understood species, apparently intermediate between the preceding and the following; and it might be regarded as a hybrid between them if it was not a little too abundant and wide-spread for that. And its habitat is usually quite different from that of *Q. laurifolia*. It is commonly planted for shade, especially in and around Tuscaloosa and Montgomery.

On account of the difficulty of distinguishing this from its relatives, and the fact that it was not recognized as a distinct species until 1918, it does not figure very largely in my field notes. It seems to be confined to the coastal plain, and to prefer rich lowlands, either alluvial or calcareous. It will probably be found in many other places besides the following:

7. Greene, Sumter, Dallas and Bullock Counties.
8. In a low pasture near Fort Deposit, Lowndes County, and probably native not far away.
10W. Wilcox and Butler Counties.
11. Choctaw County.
12. Houston County.
13 (?). Monroe County, and in a creek swamp between McIntosh and Calvert, Washington County.

*Torreya 18:72-73. 1918.
†Bot. Gaz. 65:430-431. 1918.

FIG. 36. Group of large specimens of *Quercus laurifolia*, on University campus, in winter. February 9, 1906.

Quercus laurifolia, MX. (LAUREL OAK of the books. Generally confused by the natives with either water, willow or live oak.)

(Figs. 36-39)

A neat-looking tree of medium size, with bark and acorns almost exactly like those of *Q. nigra,* and narrow leaves which are partly evergreen, about two-thirds of them remaining green on the tree until spring (a fact which is not commonly recognized in the manuals). In fact it is more completely evergreen than any of our other oaks except the live oaks and *Quercus myrtifolia.*

A common shade-tree in the coastal plain, often attaining a diameter of three feet in cultivation. The wood would doubtless make good fuel, but I have never noticed any of it cut for that purpose.

Grows usually in loamy sand, protected from fire, as in hammocks and on banks of streams. Mostly in the coastal plain. (See Bull. Torrey Bot. Club 35:529, 1906.)

Fig. 37. Twig of *Quercus laurifolia*, from University campus, with young leaves and flowers. March 22, 1911. (Contrast this with Fig. 40.)

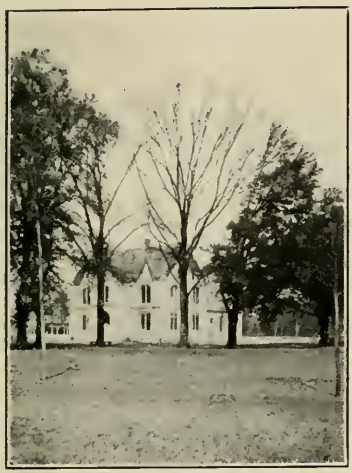
2B. Near streams, Walker, Tuscaloosa and Bibb Counties.
3. What appears to be this species grows sparingly along Black Creek at the south end of Lookout Mountain near Alabama City.
5. Near the Coosa River in Chilton and Coosa Counties, and near Channahatchee Creek a little north of Eclectic.
6A. Frequent from Tuscaloosa County southeastward.
6B. Bibb, Chilton and Autauga Counties.
6C. Pickens, Hale and Autauga Counties.
7. Sandy places near streams. Greene, Hale and Marengo Counties. Dallas County (Cocks).
8. Frequent.
9. Sumter County.
10E. Common, especially in the "pocosin" of Pike County.
10W, 11. Common.
12. Houston and Geneva Counties.
13. Frequent.
15. Baldwin County.

Quercus Phellos, L. Willow Oak.

(Figs. 38-40)

A very distinct species, resembling *Q. laurifolia* in summer, but the leaves come out revolute (rolled up) in the spring (instead of flat as in the water oaks), and all fall off early in the winter. They are a little longer and narrower than those of *Q. laurifolia*, and never develop lobes on young shoots, as most of the water oaks do.

It is a common shade-tree, but does not seem to have many other uses.



38

39

FIG. 38. *Quercus Phellos* (center) and *Quercus laurifolia*, on University campus, showing how the deciduous tree seems to be pushing the evergreen one aside; a common occurrence when evergreen and deciduous trees grow close together. March 10, 1906. (These trees must have been planted before the Civil War.) See Harper 6 in bibliography.

FIG. 39. Same two trees as in preceding figure, nearly 22 years later. January 11, 1928. This is a little closer view than the other, the growth of other shade-trees in the interval making it impossible to get a satisfactory picture from the same point as in 1906. At the time this was taken the tree in the center was 36 inches in diameter and the one at the right 39 inches.

Grows in alluvial bottoms and damp clayey flatwoods, and around ponds. Can tolerate standing water better than most oaks. Not to be expected in the mountains, where suitable habitats for it do not exist.

1A. Common in the barrens of Limestone County.
1B. Frequent.
1C. Morgan County.
2B. Walker and Jefferson Counties.
3. Common, especially in the flatwoods of Jones Valley.
5. Chambers County (the most fertile of the Piedmont counties).
6A. Frequent.
6C. Common, especially near rivers.
7. Common; making about 3% of the present forest.
8. Macon, Russell and Barbour Counties.
9. Sumter and Wilcox Counties.
10W. Occasional throughout.
11. Conecuh County.
12(?). River-bottoms in Washington County opposite Jackson.
13. Washington and Escambia Counties.

FIG. 40. Twig of *Quercus Phellos*, from the University campus, showing young leaves and flowers. March 14, 1911. (Contrast this with Fig. 37.)

ULMACEAE. Elm Family.

Includes 13 genera and about 140 species, mostly deciduous trees, in temperate and tropical regions. Some are timber trees, and some are cultivated for shade or ornament.

ULMUS, Linnaeus. The Elms.

Ulmus Americana, L. (American, or White) Elm.

A rather large and stately tree, with gracefully arching branches. It has long been a favorite shade-tree, especially in New England, where some individual trees in cities have even acquired a historical interest, and in our black belt cities. (Two horticultural varieties have been described.) Its wood is hard and tough, and is largely used in the North for cooperage, boxes, furniture, and parts of vehicles and ships. It blooms in Alabama in February, and ripens its seeds about the time the leaves appear.

It is not very abundant in Alabama, but it is found along streams and in fertile soils, and is commonest northward. Some of the trees in the southern part of the state may be referable to *U. Floridana* Chapm., a species not well understood, and not recognized at all by some of the "authorities."

1A. Limestone and Colbert Counties.
1B. Common, especially along the Tennessee River.
1C. Morgan County.
2B. Along Warrior River a few miles above Tuscaloosa.
3. Mostly along rivers.
5. On Coosa River at "Lock 12", Chilton County.
6A. Tuscaloosa and Elmore Counties.
6C. Pickens, Greene and Elmore Counties.
7. Mostly along rivers and creeks. Pickens, Sumter, Greene, Hale, Dallas and Montgomery Counties.
8. Russell County.
9. Sumter County.
10W. Sumter, Marengo, Wilcox and Butler Counties.
11. Choctaw, Clarke and Washington Counties.
14. Upper part of the delta.

Ulmus alata, Mx. (Red, or Winged) Elm. Wahoo.

(Fig. 41)

Usually a smaller tree than the preceding, with the smaller branches often corky-winged in the manner of the sweet gum (especially on young trees), and considerably smaller leaves. Blooms in February. Planted in the streets of southern cities about

FIG. 41. Roadside specimen of *Ulmus alata*, about four feet in diameter and 80 feet tall, about four miles northeast of Triana, Madison County. July 20, 1922.

as commonly as *U. Americana* is in the North. The wood has about the same properties.

Grows in bottom-lands and flatwoods, and on banks of rivers and creeks, especially in clayey and calcareous soils. Occasionally comes up spontaneously in vacant lots and along city streets, near where it has been planted.

1A. Lauderdale, Colbert and Limestone Counties.
1B. Common, especially in flatwoods, making about 2% of the forest.
1C. Morgan County.
2B. Fayette, Walker, Jefferson and Tuscaloosa Counties.
3. Frequent; about 1% of the forest.
5. Cliffs on Coosa River, Elmore County. (Doubtless occurs in most of the other counties, but I never happened to make note of it.)
6A. Franklin, Tuscaloosa and Bibb Counties.
6C. Perry, Dallas, Autauga and Elmore Counties.
7, 8. Frequent; about 1%.
9. Wilcox County.
10W. Frequent; about 1%.
11. Choctaw and Monroe Counties.
13. Rather rare. Conecuh River swamp, Escambia County. Stockton (Mohr).

Ulmus fulva, Mx. (*U. pubescens,* Walt.?) SLIPPERY ELM.

A small or medium-sized tree, with very rough leaves, and flowers in small dense clusters in early spring, ripening seeds about the time the leaves come out, as in the two preceding species. This species would make a good shade tree, and its wood is much like that of other elms, but it is chiefly noted for its mucilaginous inner bark, which is a well-known drug. In some localities it is hard to find a tree from which some of the bark has not been peeled at some time or other; and for that reason it is not often planted in streets and parks. It is said (in Autauga County) to make good fence-posts, but it is too rare to be used much for that purpose.

Chiefly confined to very rich woods, especially in calcareous soils, much like the black walnut, with which it sometimes associates. Nowhere common in this state.

1A. On limestone near Elkmont, Limestone Co.
1B. Jackson, Madison, Morgan, Franklin and Blount Counties.
2A. Cullman County (Mohr).
2B. Fayette and Walker Counties.
3. Etowah, Talladega and Shelby Counties.
6C(?). Autauga and Montgomery Counties (Mohr).
7. Greene County. Near House Bluff, Autauga County. Chalk bluffs near Demopolis. Dallas County (Cocks).
11. On limestone near Suggsville, Clarke County.

Ulmus serotina, Sargent.

A rather rare tree, probably not distinguished from other elms by persons who are not botanists. It is not very easily recognized in winter and summer, but it is in spring and fall, for it differs from all our other elms in blooming in September and October instead of February and March. Nothing is known of its economic properties, except that it is occasionally planted for shade.

Grows in rich woods, on shaly bluffs or in calcareous soils. Its distribution is imperfectly known, on account of the difficulty of identifying it, and it may be commoner than we now suppose. Dr. Mohr believed that it occurred in the black belt, but never had an opportunity to verify that.

1A. A few trees observed on south side of Mussel Shoals in Colbert County, in October, 1922.
1B. Limestone ridges, Madison County (Mohr). Bean Mountain, Morgan County (?). Warnock Mountain, Blount County (?).
2B. Walker and Tuscaloosa Counties.*
3. On a limestone ridge north of Birmingham (C. L. Boynton).†

PLANERA, Gmelin.

Planera aquatica (Walt.) Gmel. (Water) Elm.

(Fig. 42)

A small crooked tree, rarely over a foot in diameter, with small two-ranked leaves much like those of *Ulmus alata,* or perhaps stilll more like those of *Carpinus.* Flowers greenish, inconspicuous, in March. It is little known to persons not botanists, and is probably not purposely selected for any use in Alabama. In Georgia I have been told that squirrels are fond of its seeds.

Grows on banks of rivers (and occasionally other bodies of water) that fluctuate several feet (but not too much) with the seasons. Almost confined to the coastal plain. Observed on the Tennessee River near Florence, and on the Warrior and Tombigbee almost every mile from the fall line at Tuscaloosa down to the head of the Mobile delta. It seems to be less common on the Alabama River, perhaps because that stream fluctuates more, as already indicated under *Taxodium distichum.* I have seen it on the Alabama near Montgomery, and at House Bluff in Autauga

*See Plant World 9:105. 1906; Jour. Elisha Mitchell Sci. Soc. 37:157. 1922.
†Biltmore Bot. Stud. 1:143-144. 1902.

FIG. 42. *Planera*, about a foot in diameter and 30 feet tall, in Mobile delta in Baldwin County opposite Mt. Vernon. May 16, 1927.

County and Bridgeport in Wilcox (and Dr. Mohr reported it from Lisbon in Clarke, and Prof. Cocks from Hatcher's Bluff in Dallas), but not at Selma, Cahaba, Claiborne, or the railroad bridge in Wilcox County, or in traveling upstream by steamboat a whole afternoon from Dixie Landing at the northern edge of Baldwin County (in October, 1912). I have no record of it from the Tombigbee above Demopolis (where the Warrior comes in), or from the Chattahoochee, or any of the smaller rivers of the coastal plain, but of course it is not impossible that it will be found in some of those places.

CELTIS, Linnaeus. The Hackberries.

Four or five species of this genus have been credited to Alabama, some arborescent and some shrubby, but within each group they do not seem to differ in any important particular. Our arborescent ones have been referred to *C. occidentalis* L., *C. laevigata* Koch, *C. Mississippiensis* Bosc, and *C. Smallii* Beadle, which are supposed to differ more or less in the dentation of the leaves, length of pedicels, etc. But they all have about the same habitats and economic properties, and the alleged differences are of no particular concern to persons not botanists. For the present they will be treated as one species, under the oldest name.

Celtis occidentalis, L. Hackberry. (Sugar-berry.)

(Fig. 43)

A large or medium-sized tree, with unsymmetrical toothed roughish leaves, and small berries (drupes) with large stones and thin sweetish pulp. The bark is very characteristic, being commonly studded with warty protuberances, which may be an inch high. Sometimes these run together and make an ordinary-looking longitudinally ridged bark, or (in Florida at least) they may be entirely absent, leaving a smooth gray bark scarcely distinguishable from that of the beech.

The tree is commonly cultivated for shade, especially in Montgomery. The wood is not durable, but is said to be used to some extent for boxes, woodenware, and interior finish. (For further information see Circular 75 of the U. S. Forest Service.) The berries are edible, but have so little pulp around the stone that they

FIG. 43. *Celtis Mississippiensis* (?) in rich calcareous bottoms of Bodka Creek, about seven miles south of Geiger, Sumter County. February 27, 1913.

are hardly worth bothering with. Some birds are fond of them, though.

Grows mostly in river bottoms, especially in calcareous regions.

1A. Lauderdale and Limestone Counties.
1B. Common along the Tennessee River. Also on limestone in Morgan, Franklin and Blount Counties. (In this region the trees mostly have entire leaves, and may be *C. Mississippiensis.*)
2A. Marriott's Creek, Cullman County (Mohr, as *C. Mississippiensis*).
2B. Walker, Jefferson and Tuscaloosa Counties, mostly along the Warrior River.
3. Along Coosa River and in Jones Valley flatwoods, etc.
6A. Franklin County to Elmore County.
6C. Hale and Montgomery Counties, and probably all the others.
7. Common; making up nearly 2% of the present forest.
9. Sumter, Marengo and Wilcox Counties.
10W. Wilcox County, and probably all the others.
11. Choctaw, Washington, Clarke and Monroe Counties.
14. Common in the upper part of the delta.

Celtis pumila, Pursh. (*C. crassifolia,* Lam.? *C. Georgiana,* Small?)

C. pumila and *C. Georgiana* have been treated by some authorities as specifically and by others as only varietally distinct, but the differences are obscure, as in the case of the larger hackberries just mentioned, and it is easier to treat them as one, and even that may not be very distinct from the arborescent ones. It is a crooked shrub or small tree, with leaves usually thicker and rougher than those of the common hackberry. It grows in dry rocky places, sandy old fields, etc. (as *C. occidentalis* usually does in New England), and seems to require protection from fire. It is occasionally a pest in fields, something like the sassafras. It is probably commoner than the following statement indicates, for I may have passed many roadside and old field specimens without making note of them.

2A. Cullman County (referred to *C. Georgiana* by W. Wolf).
2B. Cliffs on Warrior River, Tuscaloosa County.
5. Cliffs near "Lock 12" dam on the Coosa River, Chilton County.
6A. Roadside a few miles north of Northport, Tuscaloosa County.
6C. Common in sandy old fields, Autauga County, and along roadsides and in dry woods near Montgomery.
7. Prairies near Gallion, Hale County (Mohr).
10E. Roadside three or four miles east of Troy.

MORACEAE. Mulberry Family.

About 55 genera and 100 species, mostly woody plants with milky juice, in the warmer parts of the world. Some have edible fruit (e.g., the fig and bread-fruit), some yield rubber, and some are cultivated for shade, ornament, etc.

TOXYLON, Raf.

Toxylon pomiferum, Raf. (*Maclura aurantiaca*, Nutt.) Osage Orange. (Bois d'arc.)

A small thorny tree with large heavy compound fruits about the size of a grape-fruit. Supposed to be native in the black prairies near the Red River in Oklahoma and Texas, and perhaps farther southwest. Planted for hedges in most of the eastern states, usually in rich soils. The yellow heart-wood is hard, heavy, strong and durable, and is used for felloes (especially in arid regions), posts, insulator-pins, cabinet work, and dyeing. The Indians are said to have made bows of it, and this circumstance is responsible for the French name.

In Alabama it escapes from cultivation a little in the black belt, and possibly also in the Tennessee Valley. (These are the regions most nearly resembling its natural home in Texas.) I have seen it growing apparently wild in Pickens, Sumter and Perry Counties.

PAPYRIUS. Lam. (*Broussonetia*, L'Her.)

Papyrius papyrifera (L.) Kuntze. (Paper) Mulberry.

A medium-sized tree, with trunk usually leaning, crooked, fluted, knobby, or branched low down, and rough lobed leaves. Often planted for shade, but it has little to recommend it except rapid growth. It sends up copious sprouts from the roots, and is not easy to get rid of. The wood, like that of most other fast-growing trees, is soft and lacking in durability, but it will serve for fuel when there is nothing better to be had. In Japan, its native country, the bark is said to be used for paper-making.

Runs wild in and around many of the older towns in Alabama and other southern states, especially in gullies and other damp shady places, around negro houses, warehouses, rubbish-heaps, etc. It is hardly worth while to specify localities for it.

MORUS, L. The Mulberries.

Morus rubra, L. (Common, or Red) Mulberry.

A small to medium-sized more or less crooked tree, blooming in March and April, and ripening its edible fruit in our latitudes about June. Sometimes cultivated for ornament or shade, or for its fruit. The heart-wood is yellow and very durable, and used for fence-posts where it can be had in sufficient quantity.

Grows in rich woods and bottoms, or sometimes in weedy places; frequent, but nowhere abundant.

1B. On limestone, Franklin County.
2B. Fayette, Walker and Tuscaloosa County.
3. Common, probably in every county.
5. Randolph and Lee Counties.
6A. Frequent from Lamar County to Chilton County (Mulberry Creek).
6C. Greene County to Elmore County.
7. Common throughout.
8. Sumter and Crenshaw Counties.
9. Sumter County.
10E. Crenshaw and Coffee Counties.
10W. Frequent throughout.
11. Washington, Clarke and Monroe Counties.
12. Around a limestone cave in southeastern corner of Covington County.
13 or 14. Edges of the delta in Mobile and Baldwin Counties (Mohr).

Morus alba, L. (White) Mulberry.

Native of China. A form known as *M. multicaulis* was once cultivated for food for silkworms, and it has run wild a little in Mobile County, according to Mohr.

PLATANACEAE. Plane-tree Family.

Consists only of the following genus, with one species in the eastern United States and a few others in the West and in the Mediterranean region. For the last forty years or so it has usually been placed between the Hamamelidaceae and Rosaceae; but R. F. Griggs (Bull. Torrey Bot. Club 36:389-395. 1909) suggests that its affinities are with the Urticales, which seems reasonable.

PLATANUS, Linnaeus. The Sycamores. (Plane-trees of the Old World)

Platanus occidentalis, L. Sycamore. (Called Buttonwood in New England.)

One of our largest hardwood trees, differing from all others in eastern North America in its conspicuously spotted bark, the older portions peeling off in large brown flakes and exposing the whitish newer bark beneath. The inconspicuous flowers appear with the leaves in spring.

It is planted in streets and parks in all the eastern states, and is said to stand smoke better than any other tree. There is a little prejudice against it however on account of the bark littering up the ground and the fine stiff hairs which fall from the leaves in spring and sometimes irritate human lungs, giving rise to what is known in Europe as the "Platanus cough." That must be rare in this country, but I have been told of a place in Georgia where all the sycamores in the streets were cut down 25 years ago or more, because they were believed to cause consumption.

The wood is rather difficult to work, and not very strong or durable, but it is a favorite material for butchers' chopping blocks, on account of its compactness and large dimensions. It is said to be the preferred material for tobacco boxes, especially in Virginia. More rarely it is made into veneering, furniture, interior finish, and ox-yokes.

References: Brush 1.

The sycamore grows in moderately fertile soil along streams of all sizes, and is widely distributed over the state outside of the long-leaf pine regions. As a rule the more fertile the soil the farther it extends up small streams. It seems to constitute nearly 5 per cent of the present forest in the Tennessee Valley, and nearly as much in the black belt, but of course before the country was settled, when the uplands were well wooded, its relative abundance was much less. It seems to be rare in regions 1 C, 2 A, 10 E, 12 and 13, and absent or nearly so in 4, 6 B, and 15. South of the black belt it is chiefly confined to the banks of the larger muddy streams, extending down the Alabama River to near Stockton, the Conecuh to near Brewton, the Pea to near Geneva, and the Chat-

tahoochee some distance down into Florida. It also acts like a weed sometimes, growing in gullies and moderately damp and rich woods where it could hardly have been originally.

LORANTHACEAE. Mistletoe Family

About 25 genera and over 800 species, shrubs or herbs, parasitic on the branches of trees and shrubs, mostly in tropical America.

PHORADENDRON, Nuttall. (American) Mistletoes.

Phoradendron flavescens (Pursh) Nutt. Mistletoe.

(Fig. 44)

A small evergreen shrub, parasitic on various hardwood trees. In any one neighborhood it seems to be partial to one genus of trees, and it may possibly be divisible into several species, which are to all appearances much alike but cannot be made to grow on trees too different from that to which they have been accustomed (analogous to some bacteria which look exactly alike under the microscope but react differently to various culture media).

The mistletoe is used chiefly for Christmas decorations, and large quantities have been shipped from Evergreen, Huntsville, and various other places for that purpose. The leaves and branches have some medicinal properties, but are not officinal. It is sometimes thought to be injurious to shade-trees,* but that has probably been exaggerated. As it has its own green leaves to make starch, etc., with, and grows very slowly, it ought not to be any more of a burden to a tree than one of the tree's own branches of the same size. And if it killed the tree quickly it would be committing suicide itself.

Its observed distribution will be given first by regions and then by hosts, for the benefit of any one who may hereafter desire to attack the problem of subdividing the species.

By regions it is distributed about as follows:

1A. Limestone County.

1B. Rather common, on *Hicoria ovata, Quercus Phellos, Ulmus Americana, Platanus, Gleditsia, Acer saccharinum, Nyssa sylvatica,* and *Fraxinus.*

1C. Colbert County, on *Nyssa sylvatica.*

*See W. L. Bray, The Mistletoe pest in the Southwest. U. S. Dept. Agric., Bull. 166. 1910.

FIG. 44. Mistletoe on *Quercus nigra* on University campus. February 9, 1906.

2A. Scattered from Winston County to Cherokee County, on *Quercus Marylandica, Nyssa,* etc.

2B. Walker, Jefferson, Tuscaloosa and Bibb Counties, on *Castanea dentata, Quercus Marylandica, Ulmus alata, Acer saccharinum, Nyssa sylvatica,* etc.

3. Scattered from DeKalb to Shelby County, on *Quercus Schneckii* (?), *Q. nigra, Q. Phellos, Nyssa sylvatica,* etc.

5. Clay, Chilton, Coosa and Lee Counties, on *Quercus Marylandica, Q. nigra, Nyssa sylvatica,* etc.

6A. Common, on *Populus, Betula, Quercus nigra, Q. obtusa, Q. laurifolia* (especially cultivated specimens of these three oaks), *Celtis, Platanus, Liquidambar, Prunus angustifolia, Prunus Caroliniana* (cultivated), *Acer rubrum, Acer saccharinum, Nyssa sylvatica, N. biflora, N. uniflora, Fraxinus.*

6B. Chilton and Autauga Counties, on *Nyssa biflora.*

6C. Pickens County to Macon County, on *Celtis, Acer saccharinum,* and *Nyssa biflora.*

7. Common throughout, on *Hicoria ovata, Populus, Quercus Marylandica, Q. Phellos, Celtis, Platanus, Acer saccharinum,* and *Fraxinus Americana.*

8. Bullock and Pike Counties, on *Liquidambar* and *Nyssa.*

9. Sumter and Marengo Counties, on *Hicoria ovata, Populus, Nyssa.*

10E. Barbour, Pike, Dale and Covington Counties, mostly on *Nyssa biflora.*

10W. Common, especially along rivers, on *Populus, Betula, Liquidambar,* and *Acer saccharinum.*

11. Washington County to Conecuh County, on *Populus* and *Liquidambar.*

12. Frequent, mostly on *Nyssa biflora.*

13. Common, on *Nyssa sylvatica* and *biflora.*

14. Common in lower part of delta, on *Nyssa biflora.*

Its known distribution by hosts is about as follows:

Hicoria ovata. 1B. Jackson and Madison Counties. 7. Sumter and Dallas Counties. 9. Sumter County.

Populus deltoides. 6A. Tuscaloosa County. 7. Sumter, Marengo. 8. Marengo. 9. Sumter, Marengo. 10W. Marengo, Choctaw, Clarke, Monroe. (This is almost its only host along the Tombigbee and Alabama Rivers in this region.) 11. Choctaw, Clarke, Washington.

Betula nigra. 6A. Tuscaloosa, Greene, Hale. 10W. Choctaw.

Castanea dentata. 2B. Tuscaloosa. 10W. Wilcox (cultivated?).

Quercus Schneckii (?). 3. Talladega County.

Quercus Marylandica. 2A. Winston. 2B. Tuscaloosa, Bibb. 5. Coosa. 7. Sumter.

Quercus nigra. 3. Shelby. 5. Chilton. 6A. Streets of Tuscaloosa.

Quercus obtusa and *Quercus laurifolia* (cultivated). 6A. Tuscaloosa (city).

Quercus Phellos. 1B. Morgan. 3. Jefferson. 7. Sumter.

Ulmus Americana. 1B. Jackson, Madison.

Ulmus alata. 2B. Jefferson.

Celtis occidentalis (?). 1B. Marshall. 6A. Bibb. 6C. Hale. 7. Sumter.

Toxylon pomiferum (cultivated). 6A. Tuscaloosa (city).

Papyrius papyrifera (cultivated). 6A. Tuscaloosa (city).

Platanus occidentalis. 1B. Colbert. 6A. Tuscaloosa, Bibb. 7. Hale, Greene.

Liquidambar Styraciflua. 6A. Bibb. 8. Bullock. 10W. Clarke. 11. Clarke. 13. Washington.

Prunus angustifolia. 6A. Tuscaloosa.

Prunus Caroliniana (cultivated). 6A. Tuscaloosa (city).

Gleditsia triacanthos. 1B. Jackson County.
Acer leucoderme. 2B. Tuscaloosa County.
Acer saccharinum. 1B. Jackson, Madison, Marshall. 2B. Tuscaloosa. 6A. Tuscaloosa, Greene, Hale. 6C. Hale. 7. Hale. 10W. Marengo. (Contrast this with the entries under *Populus deltoides*—a tree which grows in most of the same places—above.)
Acer rubrum. 6A. Tuscaloosa County.
Cornus florida. 13. Baldwin County.
Nyssa sylvatica. 1A. Limestone, 1B(?). Madison. 1C. Colbert. 2A. Marshall, DeKalb. 2B. Walker, Tuscaloosa. 3. Shelby. 5. Chilton, Elmore(?). 6A. Tuscaloosa, Bibb. 13. Baldwin.
Nyssa biflora. 6A. Franklin, Tuscaloosa. 6B. Chilton, Autauga. 6C. Pickens, Dallas, Macon. 8. Bullock. 10E. Pike, Dale. 10W. Sumter. 12. Covington, Geneva, Houston. 13. Mobile, Baldwin, Escambia, Covington. 14. Mobile, Baldwin.
Nyssa uniflora. 6A. Tuscaloosa County.
Adelia acuminata. Choctaw Bluff, Clarke County.
Fraxinus Americana. 1B. Marshall. 6A. Tuscaloosa. 7. Sumter.
Diospyros Virginiana. 2B. or 6A. Near North Alabama Junction, Tuscaloosa County.

No doubt this list can be considerably extended; but when all the facts are in, it will probably be found that in any one region the mistletoe (assuming it to be all one species) is confined to certain species of trees, and rare or absent on others on which one might reasonably expect it. But it may be adapting itself to more and more species all the time, as shown by its occasional occurrence on cultivated trees, which it could have had no experience with up to say 100 years ago.

SANTALACEAE. Sandal-wood Family.

NESTRONIA, Rafinesque. (*Darbya*, Gray)

Nestronia umbellulata, Raf.

A rare shrub, so little known that it has no common name and no known use. Grows in dry or rich woods.

2A. Cullman County (Mohr). A single staminate specimen seen by the writer in dry woods near east fork of Flint Creek north of Vinemont, in bloom, May 15, 1928. A few others have been seen in the same county by W. Wolf.

5. Lee County (Baker & Earle).

Pyrularia pubera, Mx., another shrub nearly as rare, belonging to the same family, which has been found in rich woods at one or two places in the Piedmont region of Georgia, and more commonly in the mountains of North Carolina, is credited to Alabama in Small's Flora of the Southeastern United States, but without definite locality and probably without sufficient evidence.

ARISTOLOCHIACEAE. Heart-leaf Family

Includes about 5 genera and 200 species, mostly South American woody vines. Some cultivated for ornament, and some medicinal.

ARISTOLOCHIA, L.

This genus is represented in Alabama by two or three herbs (Virginia snake-root, etc.) and one or two woody vines, which are called pipe-vine or Dutchman's pipe (from the curiously shaped flowers) in the books, but seem to have no bona-fide common name in this part of the world. The flowers and fruit are not often seen, because they are apt to be high up in the trees, and it is possible that every vine does not bloom every year. (I never saw the flowers until 1927.) The heart-leaf (*Asarum*) belongs to the same family.

Aristolochia tomentosa, Sims.

A high-climbing twining vine, with very porous stems, an inch or less in diameter, and large heart-shaped deciduous leaves. Blooms in April, and perhaps later. It is occasionally cultivated for ornament, but is liable to spread and become a nuisance.

Grows mostly on banks of rivers and creeks, in rather rich soils.

1B. Base of Sand Mountain, Jackson County (Harbison). Along Tennessee River near Florence (not seen in leaf, but presumed to be this species). Morgan County.

2B. Along Mulberry Fork of Warrior River, Blount County (Mohr). Along Warrior River and tdibutaries, Jefferson County.

3. Along Coosa River near Stemly and Childersburg, Talladega County.

6A. Franklin, Tuscaloosa, Bibb and Elmore Counties.

6C. Montgomery County.

7. Along Tombigbee River near Demopolis, and along Cahaba River east of Marion Junction and also just north of Cahaba.

10W. Along Alamuchee Creek near York.

11 (?). Clarke County (Denny). Monroe County.

Aristolochia macrophylla, Lam. (*A. Sipho*, L'Her.), is said by Dr. Mohr to have been collected in Winston County by Judge Peters.

POLYGONACEAE. Buckwheat Family

Includes 30 or 40 genera and about 800 species, widely distributed, mostly herbs. Many are weeds, but some have edible foliage (e.g., rhubarb), fruit or seeds (e.g., buckwheat), and some are medicinal. The trees are chiefly tropical.

BRUNNICHIA, Banks.

Only one species, and that apparently has no common name.

Brunnichia cirrhosa, Banks.

A deciduous woody vine, climbing by tendrils, with porous stems sometimes an inch in diameter, and dry winged fruits in loose clusters which hang on all winter. Blooms in June and July. Economic properties unknown.

Grows on river and creek banks and in calcareous lowlands, mostly in the coastal plain. Occasionally spreads along railroad embankments, etc., near its natural habitats. Probably more abundant in Alabama than anywhere else.

1A. Along Cypress Creek near Florence, and Tennessee River near Florence and Riverton. Some of the largest specimens are in this region.
2B. Near Corona, Walker County. Along Warrior River in Jefferson and Tuscaloosa Counties, as far up as Sayre.
5. Along Channahatchee Creek near Eclectic, Elmore County.
6A. Fayette, Tuscaloosa, Bibb and Chilton Counties.
6C. Greene, Hale and Dallas Counties.
7. Common, probably in all the counties.
8. Marengo, Dallas, Wilcox and Pike Counties.
9. Sumter and Wilcox Counties.
10E. Crenshaw County.
10W. Sumter, Choctaw, Clarke, Wilcox, Monroe, Butler.
11. Frequent in all the counties.
12. Geneva and Houston Counties.
14 (?). Mobile County (Mohr).

POLYGONELLA, Mx.

Herbs or small shrubs, with no known economic properties, and no common names in general use. They bloom mostly in summer and fall.

Polygonella polygama (Vent.) Gray.

"October Flower" (according to Mohr).

A small shrub, with small narrow leaves and numerous small pinkish flowers in late fall.

Grows on sandy beaches and old dunes, in the coast strip. Dr. Mohr found it on the shores of Fish River Bay and Perdido Bay, and I have seen it south of Orange Beach; all in Baldwin County.

Polygonella Americana (F. & M.) Small. *(P. Meisneriana,* Shuttl.)

Taller than the preceding, but still almost herb-like. Blooms in summer. In Georgia I have seen it only in sand, but Dr. Mohr reports it as having been found on limestone hills in Blount County by one of his nieces. It is evidently rare in Alabama, and I have not met it in this state at all.

1B (?) "Limestone hills," Warnock Mountain, Blount County (Mohr).
2A. Near Pisgah, Jackson County (Mohr). In sand along Bryant's Creek (Harbison). These two records may possibly refer to the same locality, or nearly so.

(There are a few other plants which seem to grow equally well in sand and on limestone, and possibly the absence of earthworms is the essential factor for them.)

MAGNOLIACEAE. Magnolia Family

About 10 genera and 80 species, trees and shrubs, natives of North America and Asia. Many are cultivated for ornament.

MAGNOLIA, Linnaeus. The Magnolias, etc.

Magnolia grandiflora, L. *(M. foetida*, Sarg.)
Magnolia (Loblolly.)

(Map 16, Fig. 45)

A magnificent evergreen tree, well known throughout the South. Its leaves are the largest of any of our evergreens except the palms and yuccas, but they vary in size on different trees. This variation may be correlated with the fertility of the soil, but it seems to have become more or less fixed, for large and small-leaved forms are sometimes cultivated side by side in the same soil without losing their characteristics. The flowers too are not exceeded in size by anything else in our flora. It blooms from April to June, and ripens its seeds four or five months later.

Planted for ornament all over the South except in the mountains and southern Florida, and said to be hardy as far north as Philadelphia. It also grows very well in California, where the climate differs greatly from that of its native home, in having no rain in summer. Four or five varieties are recognized by horticulturists.

Its wood is something like that of its "cousin" the yellow poplar (discussed a few pages farther on). It is not usually abundant enough in any one neighborhood to be an important source of lumber, and it is possible that some people would hesitate to destroy such a beautiful tree (I never heard of one being cut in Georgia when I was living there 30 to 35 years ago). But now that other kinds of wood are getting scarcer, and good roads and motor trucks make all the forests more accessible, the magnolia's beauty does not save it. Even half a century ago it was being cut for fuel in Mississippi, according to Dr. Mohr (Tenth Census U. S., vol. 9, p. 535). About the same time, or a little later, it was being made into pumps and porch columns at Memphis (largely from

Alabama material, for it does not grow wild within 200 miles of Memphis), and furniture at New Orleans. It was being used in the basket factories at Evergreen and Flomaton as long ago as 1905. Recently it has been used more extensively for such prosaic articles as crates, made by the veneer process; and last year (1927) a veneer manufacturer in Montgomery was advertising for magnolia logs, 18 inches and over in diameter, and 14 feet long.

The leafy twigs are shipped from Evergreen and perhaps elsewhere for winter decorations, and thousands of the flowers are picked every year (largely from cultivated trees, however) for temporary ornamental purposes, but they turn brown and fall to pieces in two or three days. Single leaves can be used for wreaths and other decorations, and they keep their shape and color a long time.

In its native haunts the magnolia is strictly confined to the coastal plain.* It grows in hammocks, bottoms, ravines, and on bluffs, all of which are pretty well protected from fire. It is so conspicuous, especially in winter, that its range is known pretty accurately, and is not likely to be extended much by future explorations.

6A. Creek bottoms about six miles east of Wetumpka, Elmore County. Near Shorter's, Macon County.

6C. Woods near Autauga and Pine Creeks, from Prattville a few miles southeastward.

7. Montgomery, Macon and Bullock Counties. Dallas County (Cocks). Apparently rare or wanting farther west in the black belt, perhaps because the summers are too dry or the soil too rich.

8. Frequent throughout, except in the western portions.

9. Sumter and Wilcox Counties.

10E, 10W. Common; making perhaps two or three percent of the present forest.

11. Very common.

12, 13. Common in hammocks.

15. Near Fairhope, Baldwin County.

*There are some specimens a few feet tall in dry woods near Cullman, believed to have come from seeds from cultivated trees near by, dropped by birds; but it does not seem to have been previously recorded as escaping from cultivation.

FIG. 45. Trunk and foliage of *Magnolia grandiflora*, about a mile north of Reese's Ferry bridge, in eastern edge of Autauga County. June 9, 1927.

Magnolia glauca, L.* (White, or Sweet) Bay.

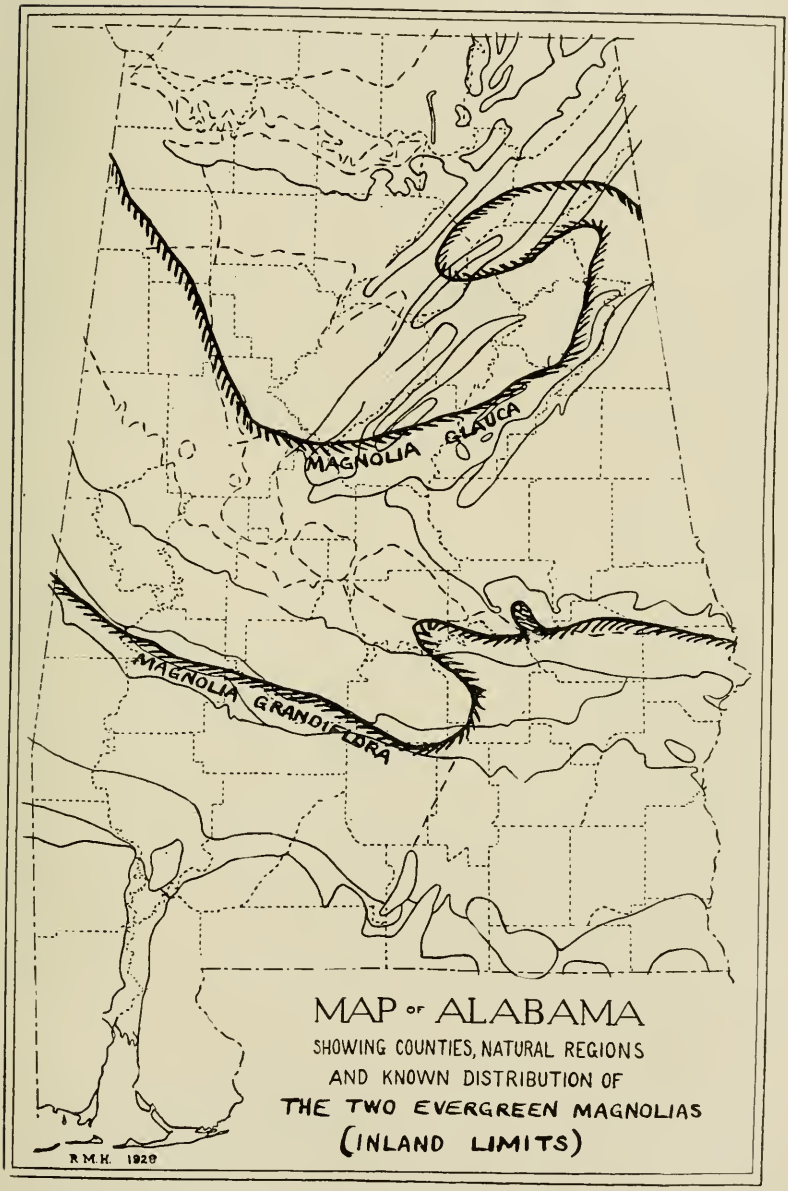
(Map 16)

Usually a smaller tree than the preceding, with smaller leaves which are white beneath (the under surfaces conspicuous from a distance when the leaves are rustled by a breeze), and much smaller flowers. I have seen a specimen three feet in diameter on Luxapalila Creek in Fayette County, but it is usually less than a foot in diameter and not more than 30 or 40 feet tall; and in flat pine woods with sour perpetually moist soil it may be only a shrub, blooming when two feet tall. The leaves usually last through the winter, and fall just as the new ones come out in April; but farther north, where the winters are colder, or in cultivated specimens in richer soils, the tree may be completely bare in winter. A small tree on the University campus, obtained from a northern nursery, loses all its leaves in midwinter, while some in yards in Tuscaloosa, presumably brought in from the woods near by, are just as evergreen as the wild ones. The bay blooms in late spring, about the same time as the magnolia, and sporadically through the summer.

It is occasionally cultivated for ornament, but is decidedly inferior to *M. grandiflora*. Two varieties have been recognized by horticulturists, one of them probably a hybrid. The dried bark

*In the first edition of Linnaeus's Species Plantarum (1753), which is taken as the starting point of botanical nomenclature, our two evergreen Magnolias were described as varieties (*glauca and foetida*) of one species (*M. Virginiana*), and some of the deciduous species as other varieties of the same. In the second edition, ten years later, Linnaeus made them separate species, calling them *M. glauca* and *M. grandiflora*. Some of our nomenclature reformers of a generation ago decided that according to the new rules these species should be called *M. Virginiana* and *M. foetida*. But a later revision of the rules, which did not allow varietal names to take precedence over specific names, threw out *M. foetida* and restored the name *grandiflora* for that species. The name *Virginiana* was still retained for the bay, however, for no other reason than because that happened to be the first of the varieties described under that specific name (which Linnaeus later discarded). It seems more logical, and less confusing, to follow Linnaeus's intentions and all 19th century usage, and call the bay *M. glauca*, regardless of a strict application of the rules.

The Alabama representatives of this species, or most of them, have been separated from the northern form by Prof. Sargent, under the name of *Magnolia Virginiana australis*, which is said to differ in having silky pubescence on the branchlets and pedicels. It has not yet been determined whether the two forms intergrade or overlap, or have entirely separate ranges; or whether any of the Alabama trees are referable to the northern form.



Map 16. Inland limits of *Magnolia glauca* and *M. grandiflora*.

has aromatic, tonic, and stimulant properties, and has been held in high esteem, but is no longer officinal. The wood is light, soft, and easily worked, but is not used much, no doubt chiefly because of its usually small dimensions. It is or has been used for fence-rails in Marion and perhaps other counties, charcoal in Chilton County, baskets at Evergreen and Flomaton, and brick-kiln fuel at Flomaton. It is said to be also good for broom-handles.

The bay grows in wet woods, non-alluvial swamps, sandy bogs, etc., where the water does not fluctuate much with the seasons, and it is usually abundant wherever it grows. It ranges nearly throughout the state south of the Tennessee Valley (where no species of *Magnolia* is known in the wild state). Its approximate inland limit is shown on the accompanying map, and its known distribution by regions is as follows:

2A. Marshall, Cherokee and Etowah Counties. (See Bull. Torrey Bot. Club 33:530. 1906.) Attains dimensions of 9 inches by 50 feet near Albertville, and a diameter of a foot near the south end of Lookout Mountain.

2B. Tuscaloosa, Bibb and Shelby Counties.

3. Not. common. Known from Cherokee, Etowah, Blount, Talladega, Shelby, Bibb and Tuscaloosa Counties, but only one or two places (in the valley region) in each county.

4. Frequent in wet ravines, especially on the sunny side of the mountains.

5. Scattered nearly throughout, but apparently wanting from an area around Lafayette, where the soil is a little too rich for it. (See remarks on this region under *Pinus polustris*. Also Map 2.) Grows a foot and a half in diameter and fifty feet tall near Knight's Ferry, Chilton County.

6A. Ranges north to Franklin County, where specimens 1x40 feet have been seen near Hodges. Possibly also near Red Bay, which is said to be named for this tree, though "red" is never a part of its name. Very common from southern Marion County southeastward; and the largest specimen on record anywhere is in Fayette County (if it is still standing).

6B. Common, especially in Chilton County.

6C. Frequent.

7. Occasional in sandy places in Dallas and Lowndes Counties (something like *Pinus palustris*).

8. Frequent.

9. Sumter County.

10E. Common throughout.

10W. Frequent, except in Wilcox County.

11. Frequent.

12. Washington, Geneva and Houston Counties.

13. Very common, but usually rather small. Shrubby in savannas in some parts of Washington County.

14. Common near the lower end of the delta, where the water is just as muddy as it is farther up, but cannot fluctuate much, on account of the proximity of the bay. It probably extends only a few miles upstream, for it is entirely wanting in the delta in the latitude of Mount Vernon.

15. Baldwin County.

Magnolia tripetala, L. *(M. Umbrella,* Lam.) CUCUMBER TREE.

A small tree, with deciduous leaves sometimes two feet long and nearly half as wide. Specimens more than six inches in diameter and 30 feet tall are rare or unknown. Blooms in April.

Occasionally cultivated for ornament, like most of the other Magnolias. The bark is a non-officinal drug.

Rather rare, in rich woods.

2A. Winston County (Mohr). Along Eight-mile Creek, Cullman County (W. Wolf). On Lookout Mountain in Cherokee County.
2B. Ravine near Tidewater (Lock 13), Tuscaloosa County.
5. Cleburne, Clay and Chilton Counties.
6A. Hale and Bibb Counties.
6B. Northwestern corner of Bibb County; rare.
6C. Prattville (Mohr). Along Pine Creek near Dosterville.
10W. Near Choctaw Corner, Clarke County (Tuomey). Mountains near West Butler, Choctaw County.
11 (?). Clarke County (E. A. Smith).

Magnolia pyramidata, Pursh. CUCUMBER TREE

This was long regarded as synonymous with *M. Fraseri,* Lam., a species said to be chiefly confined to the southern Appalachian region, while *M. pyramidata* grows mostly in the coastal plain. (See Sargent, Trees and Shrubs 1:101. 1903.) Prof. Sargent in the latest edition of his Manual of Trees credits *M. Fraseri* to northern Alabama, but without definite locality. The supposed differences between these two species are not conspicuous, and I have never learned to distinguish them, and am consequently referring all the Alabama specimens for the present to *M. pyramidata.*

A small tree, with leaves shaped something like those of the next species, but much smaller, and green on both sides. It is occasionally cultivated for ornament.

One of our rarer trees, growing in rich woods well protected from fire, like the other cucumber trees.

5. Near Knight's Ferry, Chilton County (Mohr).
6A. Havana glen, Hale County. Southeastern part of Bibb County.
7. Dallas County (Cocks).
10E. Near rivers and creeks, Pike, Coffee and Covington Counties. Dale County (Sargent). Occasionally 9 inches by 40 feet in Coffee County.
10W. Butler and Monroe Counties. Clarke County (Tuomey).
11. Clarke County (Denny).
12. Along Pea River near Geneva; rare.

Magnolia macrophylla, Mx. (Large-Leaved) Cucumber Tree.

(Map 17, Fig. 46)

A small or medium-sized tree, with the largest leaves of any North American tree outside of the palms. They are rather thin, white beneath, and sometimes over a foot wide and nearly a yard long. When they fall to the ground they usually land upside down, and their white under surfaces are then conspicuous in the autumn woods. (See Monograph 8, fig. 10.) Dr. Mohr gives its maximum diameter as 30 inches (in the "upper division of the coast pine belt", presumably in the western division of the southern red hills), but the largest trees I have seen are about 11 inches by 60 feet, and 14 inches by 20 feet, in region 2 B, both in Tuscaloosa County. On the average it is probably not more than three or four inches in diameter and ten feet tall. The flowers are about the same size as those of *M. grandiflora*, and appear mostly in May. When unfolding they are vase-shaped, or constricted a little above the middle.

This is too rare and usually too small to be used for anything but ornamental purposes. It is often cultivated in the North, and is sold by nurserymen at a much higher price than any other native *Magnolia*. It does not seem to take so readily to cultivation as some of the others.

There is probably more of this striking little tree in Alabama than in all the rest of the world. Its distribution within the state is very irregular (see map), and hard to explain on a basis of environmental factors. It grows mostly in ravines and on bluffs, where there is plenty of humus and adequate protection from fire. In the regions where it is most abundant, as in Tuscaloosa County, it sometimes springs up in clearings almost like a weed.

2A. Franklin, Marion, Lawrence, Winston and Cullman Counties. In Cullman County it seems to be chiefly confined to rocky gorges of Flint Creek and its tributaries, north of Vinemont, but I have seen a leaf in the southwestern part of the county, near Bremen, said to have come from woods near by. It is quite common in southern Lawrence County.

2B. Fayette, Walker and Tuscaloosa Counties. Common in the last, but never observed in Jefferson, though it occurs on the other side of it in Blount.

3. Near Roden, Blount County.

4. Ravine on Coldwater Mountain, Calhoun County.

5. Clay, Coosa, Chilton, and perhaps Chambers County.

FIG. 46. Twig of *Magnolia macrophylla* with leaves and a flower, from bluffs of Warrior River about 12 miles above Tuscaloosa. May 6, 1911.

6A. Common from Franklin County (Spruce Pine) to Autauga County, especially in Tuscaloosa County.

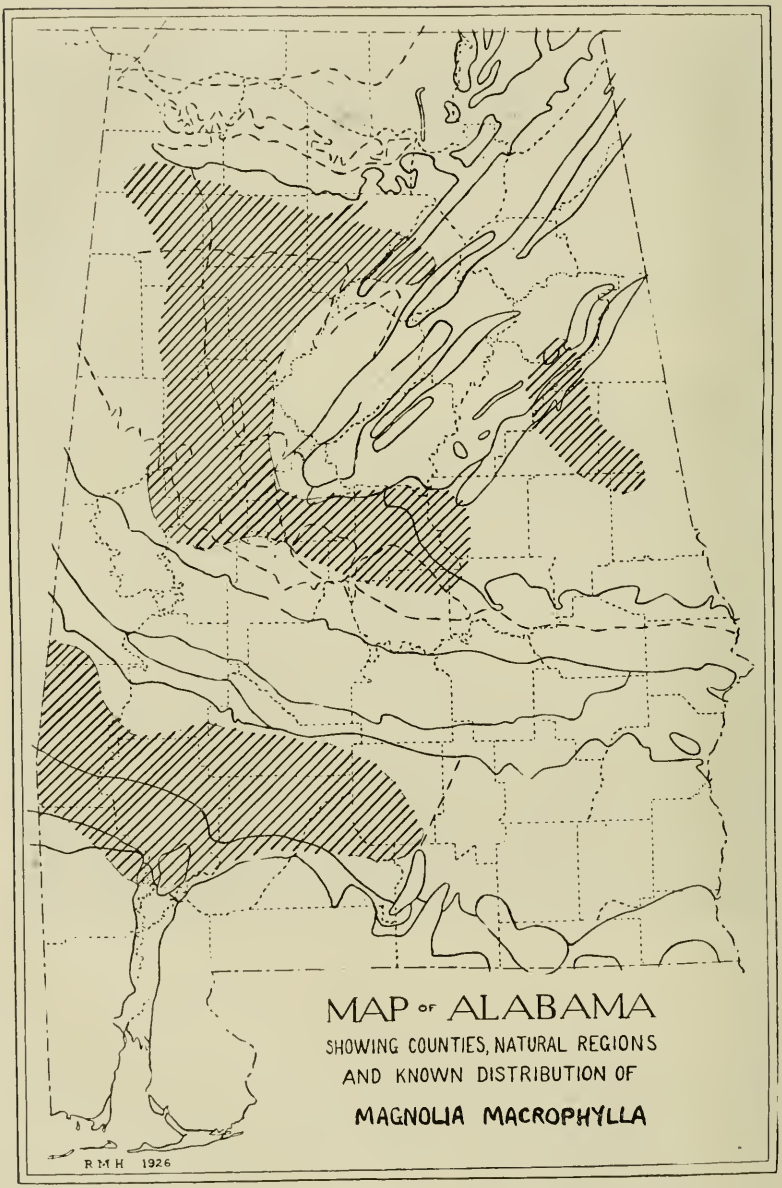
6B. Tuscaloosa, Bibb and Chilton Counties.

6C. Greene County.

7. Dallas County (Cocks).

10W, 11. Frequent in most of the counties.

13. Mobile and Baldwin Counties (Mohr).



Map 17. Approximate distribution of *Magnolia macrophylla.* (Note how this and most of the species shown on the maps following seem to avoid the black belt.) The range should have been shown as covering more of Lawrence County and less of Cullman.

Magnolia acuminata, L. CUCUMBER TREE.

A stately deciduous tree, occasionally two feet in diameter and 75 feet tall. Blooms in April. It has furrowed bark, unlike the other magnolias, and its leaves are quite differently shaped from the evergreen species and from the small cucumber trees discussed above. These differences, together with a few less conspicuous ones, have led some authors to put it in a different genus, *Tulipastrum*.

Occasionally cultivated for shade or ornament. Chiefly valuable for its wood, which is very much like yellow poplar, but there is not enough of it in Alabama to be of commercial importance. In some other states it is said to be used for pumps, hoe-handles, woodenware, boxes, etc.

Grows in rich woods, ravines, bluffs, etc., but is one of our rarer trees, usually not more than one or two specimens being visible at a time.

2A. Madison and Cullman Counties (Mohr).
2B. Fayette, Walker and Tuscaloosa Counties.
6A. Lamar (Mohr), Pickens, Tuscaloosa, Bibb and Chilton Counties.
6C. Greene County.
6C or 7. Ravines at House Bluff, Autauga County.
10E. Pike (Mohr), Coffee and Covington Counties.
10W. Wilcox, Choctaw, Monroe and Butler Counties.
1. Frequent, in Choctaw, Washington, Clarke and Monroe Counties.
13. Near Stockton, Baldwin County (Mohr).

Magnolia cordata, Mx.

This is a little-understood and somewhat mysterious species, or perhaps only a variety. It is supposed to differ from *M. acuminata* in being a smaller tree, with somewhat differently shaped leaves and smaller yellow flowers. It was discovered by Andre Michaux somewhere near the head of the Savannah River in the latter part of the 18th century, and was soon transplanted by him or some of his contemporaries to European gardens, and later brought back from there to some of the northern states, where it is still cultivated. Nothing exactly like it was seen again in the wild state for over 100 years; but in the meanwhile a few trees referred to this species had been found in the mountains of

North Carolina and Georgia, and (by Dr. Mohr in 1880 or 1882) in Winston County, Ala. (See Mohr's Plant Life, pp. 72, 505.)

More recently what is believed to be the true *Magnolia cordata* has been found in eastern central Georgia by sons of the late P. J. Berckmans, nurseryman, and in Sumter and Choctaw Counties, Alabama, by W. W. Ashe. (See Sudworth's Check List, p 121, also Ashe 4 in bibliography.) On a visit to Tuscaloosa in August, 1926, Mr. Ashe reported having just found the same thing a few miles from Duncanville, in Tuscaloosa County.

The supposed true *M. cordata* is none too distinct from *M. acuminata,* and if the trees formerly referred to it are intermediate, they furnish an additional argument against its validity as a species. Further study might reveal some real differences, though.

LIRIODENDRON, Linnaeus. (Tulip Tree).

Liriodendron Tulipifera, L. Yellow (or sometimes White) Poplar. (Sometimes called Whitewood and Tulip Poplar in the North.)

One of our largest, handsomest and commonest deciduous trees; too well known to require any description. It grows remarkably straight and tall, sometimes several feet in diameter and 100 feet tall. There are rumors or traditions of trees as much as ten feet in diameter; but such a giant would hardly escape the lumberman now, unless it was hollow, and the largest one I have seen in Alabama was about five feet, in Elmore County.

The uses of this tree are legion. It is planted a good deal in parks, especially in the North, and horticulturists recognize three or four varieties. The wood is light, soft, and easily worked, with a close straight grain, and is used for many of the same purposes as the pines. Its principal uses are for "mill-work", boxes and crates, furniture, bee-hives, pumps, porch columns, and parts of wagons, carriages, and cotton gins. It serves to a lesser extent for shingles, weatherboards, fence-palings, baskets, crossties, wood-pulp, and brick-kiln fuel. In Middle Tennessee, where pines are scarce, the poplar largely takes their place, and many log cabins are said to have been built of it. It is being used for cross-

ties (after being creosoted) in some parts of Alabama right now, but it is not well adapted for that purpose, being too soft. Next to some of the pines, it has probably been sawn into lumber more than any other tree in the South, so that the existing supply is now only a fraction of what it once was.

The inner bark, especially of the root, has tonic, stimulant, and diaphoretic properties, and it has been used a good deal in domestic medicine in the rural districts, but is not officinal. More information about the uses of this tree can be found in Circular 93 of the U. S. Forest Service.

The yellow poplar seems to prefer slightly damp non-calcareous soils, with plenty of humus and reasonable protection from fire, but no standing water. It is occasionally found on or near limestone outcrops, however, especially near Suggsville. It grows in every county, and seems to constitute from two to four per cent of the present forest of nearly every region, except 14 and 15. It is most abundant in the Piedmont region, and uncommon in the black belt.

ILLICIUM, Linnaeus. (Star-Anise).

Illicium Floridanum, Ellis.

Laurel. Stinking Laurel. Stinking Bay. Stink-bush.

(Map 18, Fig. 47)

A large handsome aromatic evergreen shrub, with odd-looking ill-scented dark red flowers scattered singly along the branches, blooming in April and early May. Easily recognized by the odor which is given off by the leaves, especially when bruised, and is much like turpentine, and not as unpleasant as some of the common names would suggest. (These names, however, may possibly allude to the flowers.) Bartram, in his Travels, speaks enthusiastically of the "fragrant groves of sweet *Illicium,*" which he saw in southern Alabama about 150 years ago.

Notwithstanding its beauty and its aromatic properties, I have never heard of this species being cultivated or used in any way; but it deserves chemical investigation. It ought at least to have some medicinal properties, like its Chinese relatives.

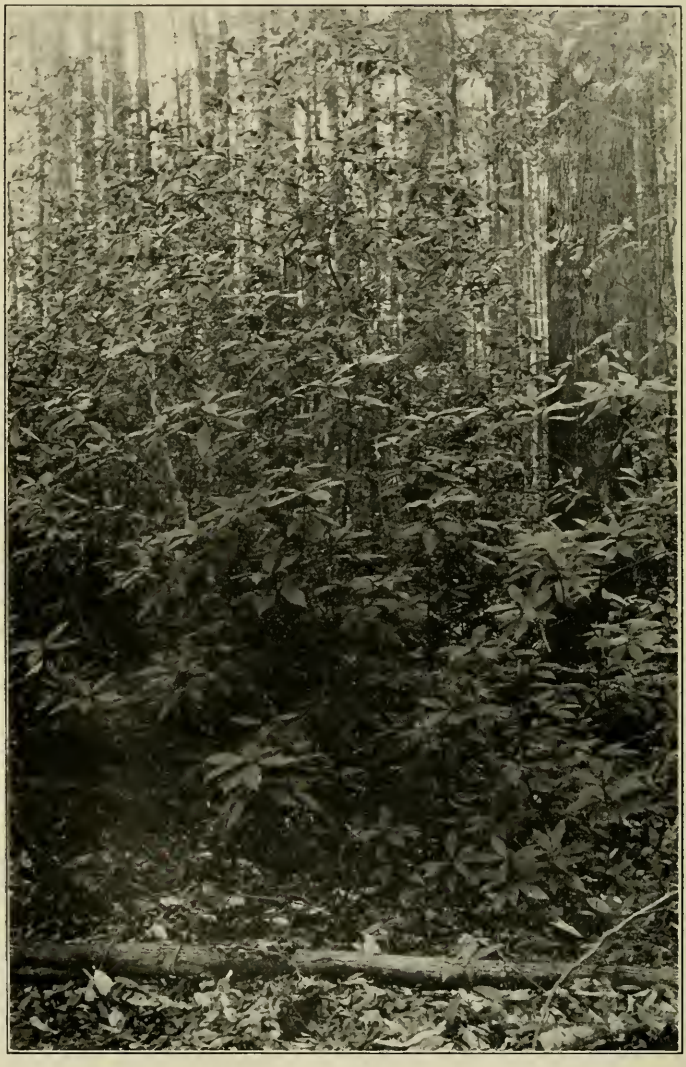
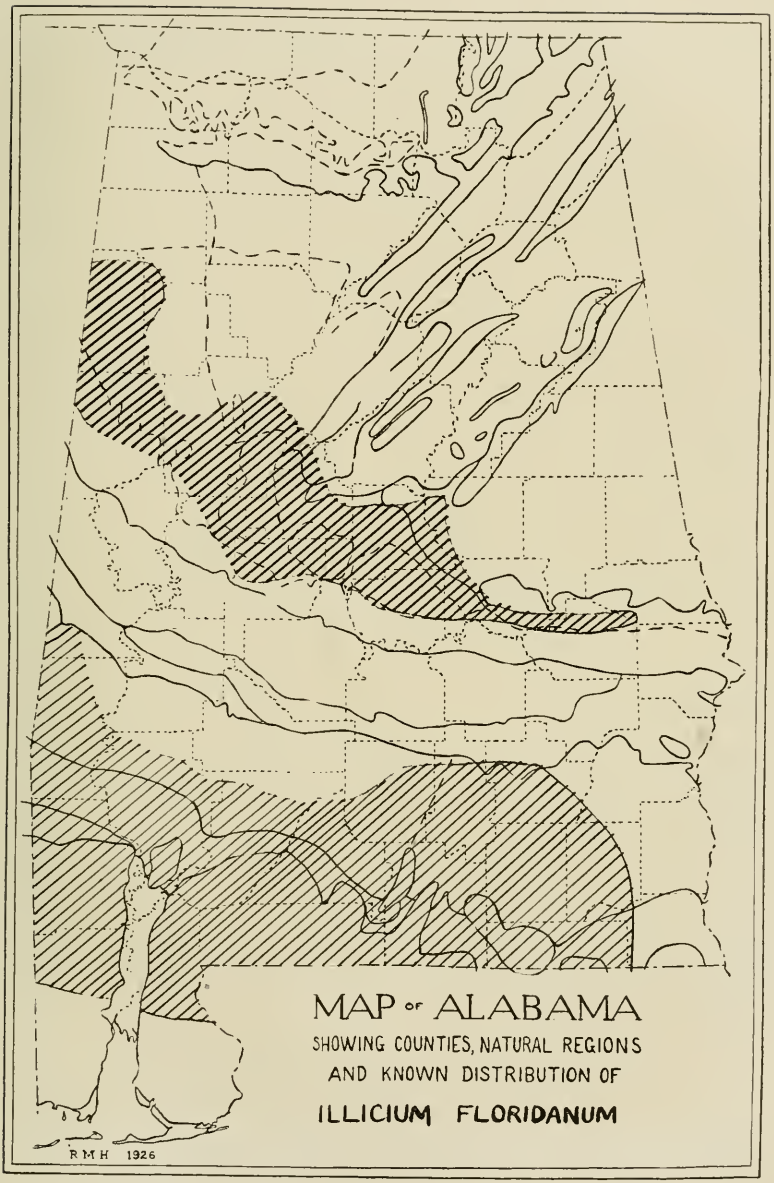


FIG. 47. *Illicium* in non-alluvial swamp about two miles south of Tuscaloosa. December 28, 1912.



Map 18. Approximate distribution of *Illicium Floridanum*.

It grows typically neither in swamps nor in hammocks, but between them, at the edges of the swamps, in situations pretty well shaded and protected from fire, but seldom if ever inundated. Like *Magnolia macrophylla*, it seems to be more abundant in Alabama than in all the rest of the world. (It is unknown in Georgia, though it ranges southeastward to Middle Florida.) It is chiefly confined to the coastal plain, and its known distribution is shown on the accompanying map. By regions the records are as follows:

2B. Several places in Tuscaloosa County, on both sides of the Warrior River.*
3. Near Woodstock, Bibb County.
5. Not far from the Coosa River in Chilton and Coosa Counties. Lee County (Earle).
6A. Common from Marion County to Elmore County. (See Bull. Torrey Bot. Club, 33:530-531. 1906.)
6B. Frequent.
6C. Perry, Autauga and Macon Counties; rather rare.
8. Conecuh River bottoms north of Troy.
10E. Dale, Coffee and Covington Counties.
10W. Sumter, Choctaw, Monroe and Butler Counties.
11. Choctaw, Clarke and Monroe Counties.
12. Washington County.
13. Mobile, Baldwin, Escambia and Geneva Counties.

SCHIZANDRA, Michaux.

Schizandra coccinea, Mx. (Wild Sarsaparilla)

A woody vine, with red flowers in June and red berries in August. It has aromatic properties, which are sometimes employed in domestic medicine.

Grows in rich woods, and doubtless requires protection from fire, like most other vines. It seems to be rare. Dr. Mohr knew it only from near Luther's Store, in Marengo County, and I have seen what I take to be the same thing a few miles northeast of Claiborne. Both localities are in region 10W. I have never seen its flowers or fruit.

ANONACEAE. Custard Apple Family.

About 50 genera and 600 species, trees, shrubs and vines, mostly in the Old World tropics. Some have edible fruit, and some are cultivated for ornament, etc.

*Laurel Branch, on the west side of the river, probably takes its name from this plant. There is plenty of *Kalmia* there too, but that does not seem to be called laurel by the natives in this part of the world.

ASIMINA, Adanson. The Pawpaws.*

Asimina triloba (L.) Dunal.

(Common, or Northern) Pawpaw.

Sometimes a small tree, 20 or 25 feet tall, but oftener a large erect shrub with few branches. The flowers are dull greenish purple, and appear just before the leaves in spring. It is sold by nurserymen for ornamental purposes, but has no particular attraction except that it is something different. Its bark is said to have been made into ropes and mats in Mississippi. The fruit is more or less edible, but not at all abundant, and therefore little known. The seeds are supposed to have some medicinal properties.

Rather rare with us, in rich woods and bottoms.

1A. Along Cypress Creek near Florence, and on the south side of Mussel Shoals. (One specimen seen there about 8 inches by 30 feet.)
1B. Near Plymouth Rock Landing on Tennessee River, Morgan County.
2B. Near Corona, Walker County. Tuscaloosa County.
3. Blount, St. Clair and Talladega Counties.
5. South of Erin, Clay County (if identified correctly).
6A. Mulberry Creek bottoms near Maplesville.
6C. Autauga and Montgomery Counties (Mohr).
7. Sandy bank of Cahaba River east of Marion Junction.

Asimina parviflora (Mx.) Dunal. Pawpaw.

Similar to *A. triloba* except in size, being seldom more than three or four feet tall, and having leaves and flowers only about half as large; but it is sometimes hard to tell large specimens of this from small ones of the preceding. The fruit is more or less edible, but is rather scarce, averaging probably not more than one to a plant.

Grows in dry but moderately rich woods and hammocks, protected from fire nearly all the time. Widely distributed but nowhere abundant. Not known in the Tennessee Valley.

2A. DeKalb and Blount Counties. Cullman County (Mohr).
2B. Tuscaloosa County.
3. Talladega County, and doubtless others.
4. Calhoun, Clay and Coosa Counties.
5. Clay, Coosa, Tallapoosa and Elmore Counties. Lee County (Baker and Earle).
6A, 6B. Tuscaloosa County.
6C. Autauga County.
7. Montgomery County.

*This word is sometimes spelled "papaw", but that form belongs more properly to the papaw or papaya (*Carica Papaya, L.*), a tropical food plant of a different family.

8. Sumter County.
10E. Pike, Henry, Coffee and Covington Counties.
10W. Wilcox County (Buckley). Choctaw and Butler Counties.
11. Clarke County.
12. Washington, Covington and Geneva Counties.
13. Mobile and Baldwin Counties (Mohr). Escambia County.

Asimina angustifolia, Gray. (Formerly confused with *A. pygmaea.*)*

A low shrub with narrow leathery leaves and rather large cream-colored flowers, appearing in summer. Fruit doubtless edible, like that of the other species.

Grows in dry sand, where the surrounding vegetation is too sparse to carry fire, in long-leaf pine regions.

10E. Dale County (E. A. Smith).
12, 13. Geneva County.

RANUNCULACEAE. Crowfoot or Buttercup Family.

A large family in temperate regions, represented almost entirely by herbs, but one species in the eastern United States is a low shrub.

XANTHORRHIZA, Marshall. (*Zanthorhiza*, L'Her.)

(Only one species.)

Xanthorriza simplicissima, Marsh. (*Z. apiifolia*, L'Her.)
Yellow-root.

A low creeping shrub with essentially unbranched slender crooked knotty stems rising scarcely a foot above the ground, and bearing a bunch of parsley-like deciduous leaves at the top. The roots and inner bark are bright yellow, whence the name. The flowers are dark purple, small and delicate, in loose clusters, appearing in March and April.

This has some use as an ornamental plant. One nurseryman's catalogue says of it:—"Undoubtedly the finest American undershrub for planting under trees, along roadways, walks and borders, or where conditions of extreme moisture prevail. . . . Now used by the thousands in parks and private grounds." Another says:—"Very ornamental. Every year it is being used more extensively as an under-planting and ground cover, giving a soft fern-like aspect of singular beauty." The bark of the root has

*See G. V. Nash, Bull. Torrey Bot. Club, 23:240-242, 1896.

been used in dyeing and domestic medicine. In DeKalb County in 1905 I was told that it is a remedy for sore mouth; and when the pellagra scare came on, some years later, it was among the remedies recommended for that.

Grows mostly on shaded banks of clear swift branches, in non-calcareous regions. Widely distributed over the state, but commonest northward.

2A. Madison (Mohr), Cullman, Marion, DeKalb, Cherokee and Blount Counties.
2A. Walker and Jefferson Counties.
4. Common along mountain streams in Clay County.
5. Randolph and Chilton Counties.
6A. Marion and Chilton Counties.
6B. Bibb and Autauga Counties.
6C. Near Prattville, and along Uchee Creek, Russell County.
10W. Choctaw and Monroe Counties, mostly among the Buhrstone mountains.
10W or 11. Clarke County (Mohr).
13. Mobile County (Mohr).

CALYCANTHACEAE. Sweet-shrub Family.

A small family with 2 genera and about 6 species, shrubs, in North America and eastern Asia.

CALYCANTHUS, Linnaeus. (*Butneria,* Duhamel). The Sweet-shrubs.

Two species of this genus are credited to Alabama by Mohr and four by Small, but the characters separating them are so obscure that I have never been able to distinguish them in the field, and for the present will refer them all to the earliest described species.

Calycanthus floridus, L. Sweet-shrub.

A medium-sized deciduous shrub, with comparatively large but inconspicuous fragrant dark purple flowers, which appear about the same time as the leaves in spring, and last until May. School-children like to gather the flowers and wrap them in their handkerchiefs so as to enjoy the fragrance all day. The bark is supposed to have some medicinal properties, and Dr. Mohr says one of the species is "deleterious to cattle." The shrub is sometimes cultivated for ornament.

Grows mostly on bluffs and in ravines, or in other rich woods protected from fire and well supplied with humus, though the soil may be sandy. Widely distributed but not abundant. Dr. Mohr

reported one species only from the hill country and the other only from south of the black belt, and it is possible that they are separated in that way, but if so it is not at present apparent which species the specimens in the coastal plain north of the black belt should be referred to.

2A. DeKalb County (Mohr). Near Mulberry Fork of Warrior River above Bangor, Blount County.
2B. Tuscaloosa County.
3. Blount, St. Clair (Mohr) and Talladega Counties.
4. Calhoun and Clay Counties.
5. Clay, Randolph, Chilton and Chambers Counties. Lee County (Baker & Earle).
6B. About two miles east of Booth, Autauga County. (See Torreya 24:82. 1924.)
6C. Rich woods about a mile southwest of Booth, and along Pine Creek below Dosterville, Autauga County.
10W. Choctaw and Butler Counties.
10W or 11. Clarke County.
13. Mobile, Baldwin and Escambia Counties (Mohr).

LAURACEAE. Laurel Family.

The laurel from which the ancient Romans made wreaths to crown their heroes and champions with is *Laurus nobilis*, a European member of this family, often cultivated in tubs in northern cities, and less frequently outdoors in the South. The avocado, cinnamon, camphor, and bay rum also come from this family, which includes about 40 genera and 1,000 species, mostly tropical. All are trees or shrubs, with aromatic properties. The various plants commonly called laurel in this country have evergreen leaves something like the European laurel, but belong to quite different families.

PERSEA, Gaertner. (*Tamala*, Raf.) The Sweet or Red Bays.

Persea Borbonia (L.) Spreng. (P. *Carolinensis* (Mx.) Nees.) Red Bay.

A medium-sized aromatic evergreen tree, with crooked or leaning trunk, seldom exceeding a foot in diameter, and furrowed brown bark. The wood is something like mahogany, and takes a fine polish, but the tree is too small and scarce in Alabama to be of any economic importance.

Grows in hammocks and bottoms, in the coastal plain.

7. Several places along Catoma Creek, Montgomery County. Rare in Dallas County (Cocks).
10E. In the pocosin, Pike County.
10W. Rich woods a few miles northeast of Claiborne.
11. Conecuh County.
13. Mobile, Baldwin and Escambia Counties (Mohr).
15. Near Orange Beach, Baldwin County.

Persea pubescens (Pursh) Sarg. (*P. Carolinensis palustris* (Raf.) Chapm.) RED BAY.

Usually a smaller tree than the preceding. Rarely large enough for saw timber, and often little more than a shrub. Differs otherwise chiefly in having the leaves rusty-pubescent below, on the veins and petioles. These differences would seem unimportant, but for the fact that the ranges and habitats of the two species are quite different.

Both species are occasionally cultivated for ornament, and the leaves are sometimes dried and used for flavoring soup.

P. pubescens grows in wet woods and non-alluvial and estuarine swamps, mostly in places where less than 5% of the area was cultivated in cotton in 1880. It is less common in Alabama than farther east, where the summers are wetter.

4. Along branches on the southeast slope of the Blue Ridge, Clay County. (See Torreya 10:220-221. 1910.)
5. Along branches near Coosa River, Chilton County.
6A. About 2 miles south and 18 miles southeast of Tuscaloosa.
6B. Spring-head in gravelly hills near Lock 14, Tuscaloosa County. Also in Autauga County.
10E. Dale County.
10W. Sumter County.
12. Geneva County.
13. Washington, Mobile, Baldwin and Escambia Counties.
14. Common in lower part of Mobile delta.
15. Near Orange Beach, Baldwin County.

SASSAFRAS, Nees & Ebermaier. SASSAFRAS.

S. variifolium (Sal.) Kuntze. (*S. officinale*, Nees)

(Figs. 48, 49)

This well-known plant is remarkably variable in size. In its natural home in the forests it is a slender tree, seldom more than a foot in diameter and forty feet tall. But when protected from competition, either by having the surrounding trees cut away, or by being planted by birds or man along a roadside or in a field, it may become much larger. Specimens two or three feet in diameter have been reported from several eastern states, and the largest one known to the writer (shown in the accompanying illustrations) is in Tuscaloosa. But the commonest form at the present time is a shrub or small tree which forms small thickets in fields not recently cultivated, or grows along fences at the edges of fields; and

48

49

FIGS. 48, 49. Two views of what may be the largest sassafras tree in Alabama, in eastern part of Tuscaloosa (12th St. near 10th Ave.), taken from same point, in spring, about six years apart. March 21, 1913, and April 11, 1919. On the latter date the trunk was 34 inches in diameter, breast-high. At the present time the tree is in a thickly settled neighborhood, and about half its branches are dead. Nothing is known of its history previous to 1913, but it probably did not grow up in a virgin forest, but more likely in the yard of some farm-house.

in that form it is somewhat of a nuisance. These sprouts or saplings have some redeeming features, however, for they are often cut for pea-vine supports, brooms, hoops, etc., and the roots are dug for sassafras tea, a popular semi-medicinal beverage or spring tonic in the rural districts. (I have even seen sassafras roots on sale at grocery stores in Birmingham.) In some parts of the country the natives distinguish two kinds of roots, "red" and "white" sassafras, and regard the latter as poisonous; but no such distinction is made by botanists, and if there is any difference it is probably due to age, habitat, or some other unimportant factor.

The whole plant, like other members of the family, is aromatic, and the pith, the bark of the root, and the oil distilled from it, are officinal in the U. S. Pharmacopoiea. The leaves are sometimes used for flavoring soup, like those of *Persea*. The wood is light, soft and weak, but durable, and the Indians sometimes carved canoes out of single logs of it. It is used to some extent for fence-rails, posts, and telephone poles. Along a country road near Dade-

ville in 1906 I saw a good many of the latter about 8 inches in diameter and 20 feet tall (above the ground), which must have been cut somewhere near by. Wailes, in his report on the geology and agriculture of Mississippi (1854, p. 353), says that it was in great demand in that state for shingles, and large trees had already become scarce. It is occasionally cultivated for ornament, in regions where it is not too common naturally.

The natural habitat of the sassafras seems to be on bluffs and river-banks, but like several other species associated with it, it runs wild in old fields and along roadsides, which are as well protected from fire as its native haunts. (It is probably not as sensitive to fire as some of our other trees, though.) It is widely distributed in those parts of the state where farming is carried on extensively, and more than 10% of the area was cultivated in cotton in 1880. In regions 4 and 6B it seems to grow wild in the pine forests, but only as a low shrub, perhaps because fires are too frequent there to allow it to develop into a tree; and as it seldom if ever blooms under such conditions, the seeds must be continually brought by birds from other regions. Some of the largest known native specimens are in regions 2B and 6A, in Tuscaloosa County. Native specimens seem to be rare south of the black belt.

BENZOIN, Fabricius. Spice-wood. Spice-bush.

Benzoin aestivale (L.) Nees. (*Lindera Benzoin*, Blume)

An aromatic deciduous shrub, with small yellow flowers appearing in early spring before the leaves, and red berries in fall. Sometimes cultivated for ornament. The berries and bark are medicinal, but not officinal. In Marengo County I have been told that a decoction of the twigs is used for a beverage by the negroes.

Grows in rich or damp woods; not common in Alabama, where it seems to prefer calcareous soils.

1B. Jackson and Marshall Counties.
2A. On Monte Sano, Madison County.
2B. Rich ravine near Tidewater (Lock 13), Tuscaloosa County.
6C or 7. Hale County (Mohr).
8. Hammock of Chickasawbogue Creek, Marengo County.
10W. Wilcox County (Mohr). South of Searcy, Butler County. Rich woods northeast of Claiborne, Monroe County.
11. Near Salt Creek, Clarke County.

Benzoin melissaefolium (Walt.) Nees.

A perfectly distinct species, but rare and little known. Said by Dr. Mohr to have been collected by Buckley near Allenton, Wilcox County; but apparently not seen in Alabama by any botanist in the last 75 years.

SAXIFRAGACEAE. Saxifrage Family.

In the broader sense this includes about 75 genera and 1000 species, mostly herbs and shrubs, in the cooler parts of the world. Several are ornamental.

PHILADELPHUS, Linnaeus. Syringa or Mock Orange.

Medium-sized deciduous shrubs, with handsome white flowers, blooming mostly in May. The limits of the species are rather uncertain, and at least five species have been credited to Alabama, but most of them look very much alike, especially when not in bloom. Except for first species listed below, I have not been able to distinguish them in my field work, and all the others will be lumped together for the present.

They are often cultivated for ornament, and some of the cultivated forms do not seem to be exactly matched by any known in the wild state.

Philadelphus hirsutus, Nutt.

Grows on dry siliceous cliffs, mostly among the mountains.

1A. Along Cypress Creek near Florence (Mohr).
2A. Jackson County (Harbison); DeKalb County (Mohr).
4. Summit of Coldwater Mountain, Calhoun County.

Philadelphus inodorus, L. (etc.)

Grows on bluffs and cliffs, well protected from fire.

1A. Colbert and Lauderdale Counties.
1B. Jackson County. Along Tennessee River near Plymouth Rock Landing, Morgan County.
2A. Marshall County. (?).
2B. Rocky bluffs near Simpson's Creek, Cullman County. (Flowers smaller and leaves rougher than usual.) Shale bluffs on Warrior River, Tuscaloosa County.
3. Cherokee, Talladega and Bibb Counties.
5. Lee County (Underwood & Earle).
6A. Elmore County. (?)
7. Montgomery County. (?)
10W. Wilcox County (Buckley).
11. Clarke County.

HYDRANGEA, Linnaeus. The Hydrangeas.

Hydrangea arborescens, L.

A deciduous shrub, with crooked or drooping stems two or three feet long, and flat-topped clusters of small white flowers, the outer ones often enlarged and sterile like those of the garden hydrangeas. Blooms mostly in May.

Occasionally cultivated for ornament. The roots are said to be somewhat astringent.

Grows in ravines and on bluffs well protected from fire, mostly in the northern parts of the state.

1A. Lauderdale County (Mohr). Bluffs on south side of Mussel Shoals in Colbert County.
1B. Rocky woods near Blount Springs.
2A. Pisgah gorge, Jackson County (Harbison). Slopes of Lookout Mountain near Valley Head. DeKalb and Cullman Counties (Mohr). Near Short Creek, Marshall County. Warnock Mountain, Blount County.
2B. Walker, Jefferson and Tuscaloosa Counties.
3. Blount and Talladega Counties.
4. Coldwater Mountain, Calhoun County. Clay County (Mohr).
5. Cleburne, Clay, Chilton and Elmore Counties.
6A. Franklin, Pickens, Hale and Elmore Counties.
6C. Autauga County.
7. Near Demopolis. Hatcher's Bluff, Dallas County.
10E. Near Elba.
10W. Near Greenville and Claiborne.

Hydrangea cinerea, Small.

According to H. St. John (see bibliography) the plants described under this name include forms of *H. radiata* Walt. and two varieties of *H. arborescens* (*oblonga* and *Deamii*). But as nearly all my field work in Alabama was done before that opinion was published, these different forms are not separated in my notes, and will have to be treated as one for the present. *H. arborescens cordata,* treated separately with some hesitation by Dr. Mohr, is regarded by Mr. St. John as indistinguishable from *H. arborescens.* Generally speaking, this aggregate differs from typical *H. arborescens* in having the leaves larger, or tomentose beneath, or both. (The extreme with leaves white beneath, *H. radiata,* is not certainly known in Alabama.)

These large-leaved plants have much the same habitat as *H. arborescens,* but tend toward richer or shadier places.

1A. Banks of Tennessee River near Florence (Mohr).
1B. On Mountain limestone in Madison and Marshall Counties.

2A. Pisgah gorge, Jackson County (Harbison; reports both *H. cinerea* and *H. radiata*). DeKalb County.
2B. Ravine a few miles from Squaw Shoals (Lock 17), Tuscaloosa County.
4. Alpine Mountain, Talladega County.
5. Bluffs near Big Sandy Creek, Tallapoosa County.

Hydrangea quercifolia, Bartr. SEVEN-BARK

(Map 19, Figs. 50, 51)

A very distinct and handsome species, readily recognized by its large oak-like leaves which are white-downy beneath, and its large elongated flower-clusters; or in winter by its coarse twigs, and loose bark, several layers of which are continually peeling off (whence the name). Grows about five feet tall. Blooms in May and June.

This is cultivated for ornament locally in and near its range, but does not seem to be sold by nurserymen, although it is the most showy American species of *Hydrangea*. It is more or less medicinal, like the other species.

Grows mostly in ravines and on bluffs and cliffs, where it is pretty well protected from fire. It is widely distributed over the state (see map), and there is probably more of it in Alabama than in all the rest of the world.

1A. Lauderdale and Colbert Counties.
1B. In Brown's Valley, in Marshall and Blount Counties.
1C. Colbert County.
2A. Frequent in most of the counties, especially Cullman.
2B. Abundant in most of the counties.
3. Jefferson, Talladega and Bibb Counties.
4. Rather common throughout.
5. Frequent, except perhaps in Chambers County.
6A. Franklin, Tuscaloosa, Bibb and Elmore Counties.
6B. Tuscaloosa County.
6C. Autauga County.
7. Hatcher's Bluff, and ravines southwest of Pleasant Hill, Dallas County.
8. Eastern part of Russell County.
10E. Pike, Dale, Coffee and Covington Counties; rather rare.
10W. Choctaw, Butler and Monroe Counties.
11. Choctaw, Washington and Clarke Counties.
13. Escambia and Mobile Counties.

ITEA, Linnaeus. (Only one species).

Itea Virginica, L. (Apparently no common name).

A shrub about medium size, with few ascending or nodding stems, deciduous leaves, and racemes of small white flowers in May. Sold by some nurserymen for ornamental purposes.

FIG. 50. Near view of *Hydrangea quercifolia*, with flower clusters over a foot long, on edge of right-of-way of M. & O. R. R. about two miles southeast of Lawley, Bibb County. June 11, 1924. (The plant may be a little more luxuriant in such a situation than it would have been in a virgin forest.)

FIG. 51. Cultivated specimen of *Hydrangea quercifolia*, in Tuscaloosa. June 11, 1923.

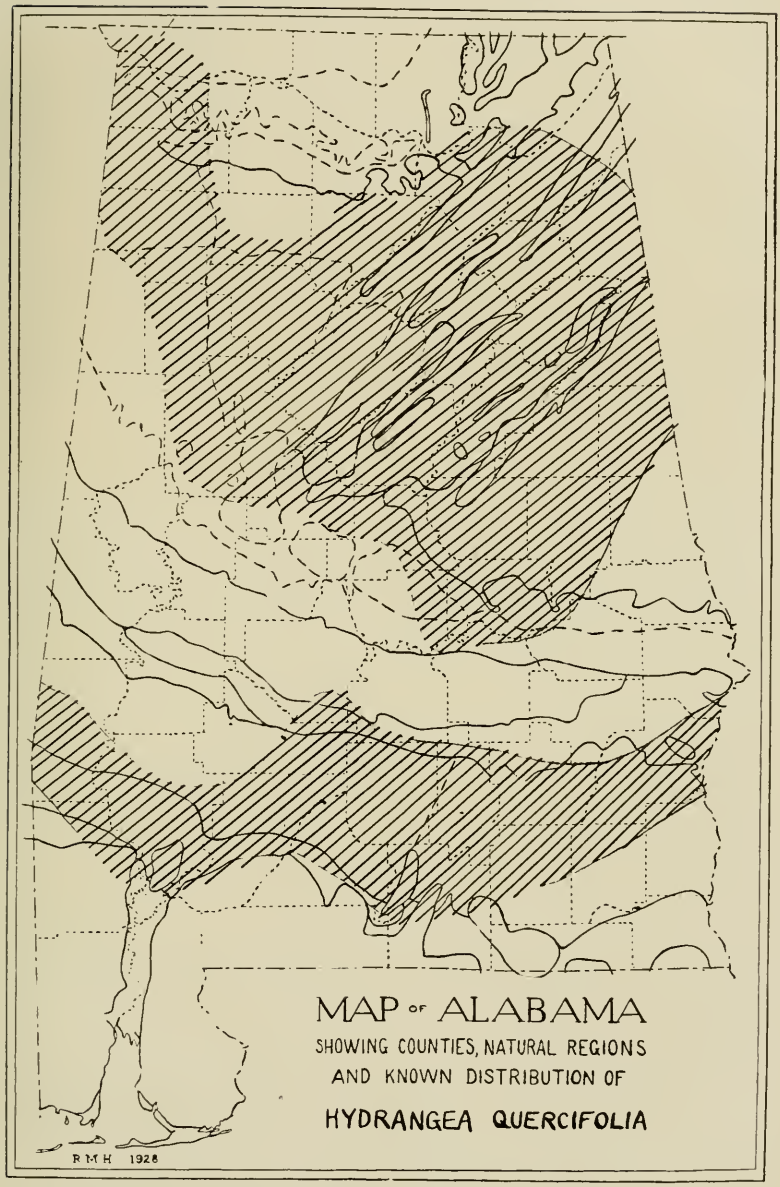
Grows in wet woods, swamps and sloughs; in nearly every region, but nowhere abundant.

1A. Lauderdale County (Mohr). Limestone County.
2A. Cullman, Blount, DeKalb and Cherokee Counties.
2B. Walker and Tuscaloosa Counties.
3. Shelby County.
4. Clay County.
5. Cleburne and Randolph Counties.
6A. Pickens and Tuscaloosa Counties.
6B. Autauga County.
6C. Bibb and Autauga Counties. Grows about an inch and a half in diameter and 15 feet tall on Autauga Creek near Booth.
7. Montgomery County (Mohr). Marengo County.
8. Marengo and Pike Counties.
10E. Pike County.
10W. Choctaw and Butler Counties.
11. Choctaw and Conecuh Counties.
12. Houston County.
13 (?). Mobile County (Mohr).
14. Baldwin County.

DECUMARIA, Linnaeus.

Decumaria barbara, L. (Apparently no common name).

A woody vine, climbing high up into trees, or sometimes on rocks, by means of rootlets which attach themselves to rough surfaces in the manner of the English ivy and our poison ivy. Leaves



Map 19. Approximate distribution of *Hydrangea quercifolia*.

opposite, simple, smooth, entire, deciduous. Flowers small, white, in loose clusters, in May.

It seems strange that this common and handsome vine, which is sold by some nurserymen for ornamental purposes (though I have never seen it in cultivation), should have no common name. If it grew in the thickly-settled northeastern states, where nature-lovers and literary people are numerous, it would probably have been given a name and even written about by poets long ago.

Grows in wet woods and swamps, in nearly all parts of the state.

1A (?). Lauderdale County (Mohr).
2A. Winston, Cullman and Blount Counties.
2B. Fayette, Walker and Tuscaloosa Counties.
3. Bibb County.
4. Calhoun and Clay Counties.
5. Cleburne, Randolph and Chilton Counties.
6A. Common throughout.
6B. Bibb and Autauga Counties.
6C. Greene and Perry Counties.
7. Dallas County, especially in ravines of the plateau in the southern part of the county. Montgomery County (Mohr).
10E. Crenshaw, Dale and Covington Counties.
10W. Sumter, Choctaw and Clarke Counties.
11. Choctaw, Washington, Clarke, Monroe and Conecuh Counties.
12. Houston County.
13. Mobile (Mohr) and Baldwin Counties.

GROSSULARIACEAE. Gooseberry Family.

Includes one or two genera and about 130 species, mostly shrubs of the north temperate zone. Some have edible fruit and some are ornamental.

RIBES, Linnaeus. The Currants and Gooseberries.

Our two species belong to the gooseberry tribe (*Grossularia*), which is often treated as a separate genus, and perhaps justly so.

Ribes curvatum, Small.

A small prickly deciduous shrub. Recommended by nurserymen as excellent for rock gardens. The fruit may be edible, but it is too rare to be of any importance.

Grows on rocky slopes and ridges, protected from fire, in mountainous regions.

2A. Along Short and Drum Creeks near Albertville, Marshall County.
4. On the highest ridges. Cedar and Cheaha Mountains.

Ribes Cynosbati, L.

Much like the preceding in properties and habitat.

Known only from the plateau region (2A), where Mr. Harbison found a few specimens in Marshall County, and more near Bryant's, Jackson County.*

HAMAMELIDACEAE. Witch-hazel Family.

About 20 genera and 50 species, trees and shrubs, mostly in North America, Asia and Africa. A few are ornamental or medicinal, and one is a timber tree.

HAMAMELIS, Linnaeus.

Hamamelis Virginiana, L. Witch-hazel.

A large shrub, with pale yellowish faintly scented flowers appearing mostly after the leaves fall, from October to January. In mild winters some of them last until the alder (our earliest-flowering native woody plant) blooms in spring.

Occasionally cultivated for ornament. The leaves, bark and twigs are officinal, and enter into the well-known witch-hazel extract, and other liniments and salves. The branches are said to have been formerly used for "divining rods", to locate water.

Prof. Sargent a few years ago† asserted that the witch-hazel of the coastal plain should be referred to *H. macrophylla* Pursh, restricting the typical *H. Virginiana* to a more northerly range. But the differences must be small, or more people would have noticed them; and as most of my field work was done before this distinction was suggested, I cannot separate the two forms in my notes. Even if the extremes are different enough, they must intergrade or overlap geographically, for there is no noticeable gap between them in Alabama.

The witch-hazel grows in dry woods and hammocks, reasonably exempt from fire, in nearly all parts of the state. It is common in regions 2A and 5, and rare or unknown in 1A, 9 and 14.

---

*See pages 153 and 156 of his paper cited in the bibliography.
†Jour. Arnold Arboretum 1:246, "April" [May] 1920.

FOTHERGILLA, Murray. (No common name).

Fothergilla Gardeni, Murr. (*F. Carolina* (L.) Britton).

A small shrub, usually about knee-high, with leaves much like and pods something like those of *Hamamelis*, but with white flowers in dense clusters in spring. Has no known use, except that it is sometimes cultivated, more as a rarity or curiosity than anything else.

Grows mostly in sandy bogs; rather rare.

1A. Lauderdale County (M. C. Wilson).
2A. Cullman County (Mohr). Marshall County (C. L. Boynton, Harbison).
6C (?). Prattville (Mohr).
13. Sandy bog south of Andalusia.

F. major Lodd., a somewhat larger species, is credited to the mountains of Alabama by Dr. Small, but without definite locality. The *Fothergilla* along Eight-mile Creek in Cullman County is referred by W. Wolf to this species.

LIQUIDAMBAR, Linnaeus. (Only one species in the United States.)

Liquidambar Styraciflua, L.

Sweet Gum. (Red Gum of the lumber trade.)

A well-known tree, one of the commonest in the state, next to some of the pines and oaks. Attains a diameter of about four feet, particularly in the Sipsey River bottoms near Fayette, but most specimens at the present time are less than two feet. Blooms in March and April.

The sweet gum is so common that it is inevitable that it should have many uses. It is cultivated in parks and along streets (mostly in the northern and middle states, where it is rarer and more appreciated than in the South), and is especially showy in the fall, when its leaves turn purplish. The curious fruits (sweet-gum balls) and corky-winged twigs are sometimes used for decorations and fancy articles. The gum that exudes from the inner bark when it is wounded is used to some extent in the treatment of catarrh and frost-bite, and in the manufacture of chewing-gum, but it is not officinal.

One might suppose that such a common tree would be used largely for fuel; but it does not seem to be specially sought for that purpose. It was used for steamboat fuel in Mississippi in the middle of the last century, though, according to Wailes.

The wood is difficult to season and much inclined to warp, and for that reason was not used much for lumber up to half a century ago. But the depletion of other hardwoods has led manufacturers to fall back on this and other formerly despised species more and more, and it has been found that with proper treatment it is well adapted for furniture, cabinet-making, interior finish, boxes, slack cooperage, and various other purposes. In fact it now largely takes the place of black walnut, which it somewhat resembles. At the present time it is used more than any other wood for boxes made by the veneer process, i. e., of thin sheets stiffened at the edgs by thicker strips of some other wood, which prevent warping and at the same time give strength to the whole box. Another use which has developed in the last fifteen years or so is for the wooden cores of the spools on which photographic films are wound; for in such small pieces the tendency to warp is not perceptible.

There are some interesting notes on this species in Wailes's report on the geology of Mississippi (1854), and three pages are devoted to it in Miscellaneous Special Report No. 3 of the U. S. Department of Agriculture, on the resources of Mississippi, published in 1883. See also the bulletins by Chittenden and Von Schrenk cited in the bibliography.

The sweet gum grows in all sorts of soils except the poorest and driest, in every region in Alabama and doubtless in every county. It makes about 4% of the present stand of timber in the state, rising to over 5% in regions 6C, 7, 9 and 14, and falling below 2% apparently only in 4 (where it is confined to the lower slopes of the mountains), 12 and 13. In addition to its native haunts in the forests and swamps, it is rather common as a sort of weed in old fields, low pastures, and along roadsides. In damp sandy soils, especially in the long-leaf pine regions, it often has the dimensions of a large shrub, with no large trees of it in sight, but it does not seem to bloom in that stage, and just how it perpetuates itself there is not obvious.

ROSACEAE. Rose Family.

This is a large family in temperate regions, with about 65 genera and 1,000 species, and includes a great many ornamental and useful plants, especially fruits of many kinds. Most 19th century botanists included in it the apples and plums and their relatives; but although those are very similar in floral characters to the typical Rosaceae, they differ so much in fruit that it seems best to put them in separate families. All our representatives of the rose family proper are herbs and shrubs, while those of the apple and plum families are mostly trees.

OPULASTER, Medicus. (*Neillia*, Don; *Physocarpus*, Raf.)

(Nine-bark.)

Medium-sized deciduous shrubs, with white flowers in clusters near the ends of the branches, in spring. Occasionally cultivated for ornament.

The Alabama specimens have been variously referred to *Opulaster opulifolius* (L.) Kuntze, *O. Alabamensis* and *O. intermedius* Rydb., and *Physocarpus stellatus* (Rydb.) Rehder; but they are probably all much alike, and they are also rare. Treating the whole aggregate as one species, its known distribution in Alabama is as follows:

1A. Rocky banks of Cypress Creek near Florence (M. C. Wilson).
3. Valleys near Sanford Springs, Cherokee County. (H. E. Wheeler, June, 1926.)
5. Wright's Mill, Lee County (F. S. Earle).

SPIRAEA, Linnaeus. (Bridal Wreath, Meadow Sweet, etc.)

Spiraea corymbosa, Raf.

A small deciduous shrub, with white flowers in late spring. Found on the banks of Cypress Creek near Florence by Prof. Wilson.

NEVIUSIA, Gray. (Only one species).

Neviusia Alabamensis, Gray. (Too rare to have a common name.)

(Figs. 52, 53)

A deciduous shrub with many slender recurving stems and white flowers with many stamens and no petals, in March. Takes

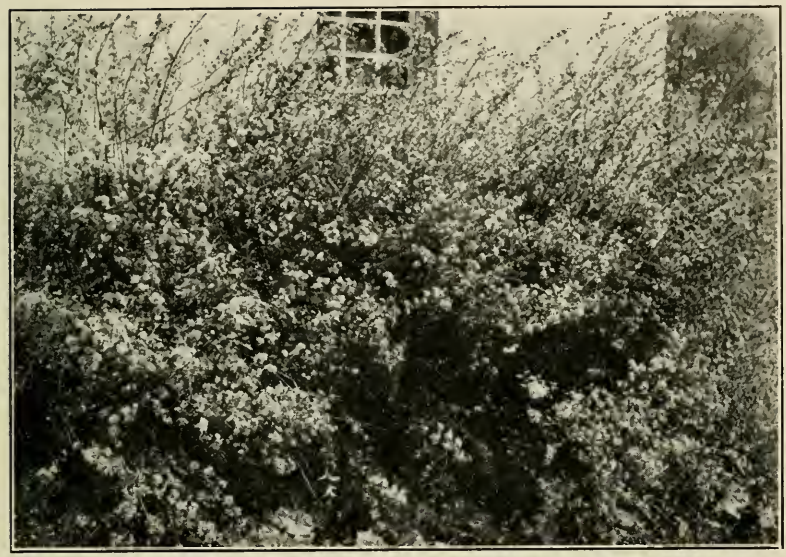


FIG. 52. Clump of *Nevinsia* in bloom, on south side of Smith Hall, on University campus. Walter B. Jones, March 27, 1926. (In its native haunts this is usually in such shady places, or so mixed with other shrubbery, that it is difficult to get a satisfactory picture of it.)

readily to cultivation, and is said to be hardy as far north as Massachusetts.

This unique plant, with its nearest relatives Asiatic, was discovered near Tuscaloosa by Drs. R. D. Nevius and W. S. Wyman in the spring of 1857. (Both of these gentlemen were living half a century later.) It is not known to grow wild outside of Alabama, except that J. C. T. Uphof (Am. Jour. Bot. 9:7. 1922) claims to have found a single specimen on a southeast-facing slope of sandy loam in Butler County, Missouri.

References:—Harper 3, 19, Mohr 6, Pollard.

Grows on bluffs and slopes of limestone and shale, usually in shady places.

1B. Mountain slopes east of New Market, Madison County. (See Bull. Torrey Bot. Club 33:532. 1906.) Base of Sand Mountain, Jackson County (Harbison). Limestone ridge between Somerville and Falkville, Morgan County.

2B. Shale cliffs on both sides of the Warrior River within about ten miles of Tuscaloosa. (See Plant World 3:136. 1900; 9:105. 1906.)

FIG. 53. Near view of flowers of *Neviusia,* same time as preceding picture.

RUBUS, L. The Blackberries, Raspberries, etc.

Shrubs or trailing vines, mostly thorny, with compound leaves and usually edible fruits. A puzzling genus, more so in the northern states and in Europe than with us. Many alleged new species have been described in recent years, and there is no telling how many may eventually be credited to Alabama. At present about half a dozen is all that can be distinguished in this state by one who has not made a special study of them.

The fruits of some are of considerable commercial importance, and most of the species possess medicinal properties, especially in the bark of the root. Most of them are more frequent as weeds in old fields and along roadsides, where they are pretty well protected from fire, than in any natural habitats.

Rubus floridus, Tratt. (*R. nigrobaccus,* Bailey?) Blackberry.

To this species may be referred provisionally the common blackberries of moderately rich soil, pastures and thickets, particularly in the upper half of the state. They also grow often in damp places, such as clearings in swamps. The time of blooming varies with the latitude, but is usually March to May. These blackberries are common and widely distributed outside of the regions where long-leaf pine predominates.

Rubus cuneifolius, Pursh. Blackberry. (Brier-berry.)

Differs from our other species in having smaller and thicker leaflets covered beneath with short dense whitish down. Its natural habitat is not certainly known, but it is common on sandy roadsides and in sandy old fields, mostly in the coastal plain.

Reported by Dr. Mohr from Lauderdale and Cullman Counties. Occurs near Tuscaloosa, but is much more common south of the black belt. It is almost the only bush blackberry in regions 8, 10E, 12 and 13.

Rubus trivialis, Mx. Dewberry.

Our common dewberries may represent more than one species, but they are all trailing vines, with leaves evergreen or nearly so, flowers and fruit about a month earlier than the blackberries, and

fruit with fewer and larger drupelets, a little juicier and otherwise better than that of most of the blackberries.

Where this grew a few centuries ago is a mystery, for it seems to be confined now to habitats considerably altered by civilization, such as old fields and roadsides. It is widely distributed over the state, apparently most common in the central portions, and comparatively rare in the long-leaf pine regions, though it extends to the shores of Mobile Bay.

Rubus hispidus, L. (Swamp Dewberry.)

A small evergreen vine, with fruit scarce and practically tasteless.

Native in damp woods. Reported from Lookout Mountain and Lee County by Dr. Mohr; but according to Prof. Earle the latter record is an error.

Rubus occidentalis, L.
Black-cap Raspberry. Thimble-berry.

A neat shrub with few prickles; the stems and under surfaces of the leaves waxy. Blooms in April, fruit ripe in June.

Grows in rocky woods; rare in Alabama but common farther north.

1B. On limestone near Scottsboro, Jackson County. Warnock Mountain, Blount County.
1C. On sandstone on Smithers Mountain, Madison County.
2A. On Monte Sano and Lookout Mountain, at elevations above 1,500 feet (Mohr).

Rubus odoratus, L., the flowing raspberry, a handsome northern species with simple leaves, large pink-purple flowers, and worthless fruit, is credited to Alabama by Small, but without definite locality and probably without sufficient evidence.

ROSA, Linnaeus. The Roses.

Another puzzling genus, especially in the North and in Europe, where it is represented by innumerable cultivated forms, mostly double-flowered, and a few single-flowered species that are native or have escaped from cultivation. Only about three native species are known in Alabama, and about the same number of introduced ones.

Rosa setigera, Mx.

A distinct species, with only three leaflets.

Grows mostly in calcareous soils. Reported by Dr. Mohr from Falkville, Lookout Mountain (locality not specified), Hale County (presumably in the black belt), and Uniontown (Perry Co.). I have seen it only on chalky roadsides in Greene County, but it is there associated with several undoubtedly native species, and it probably occurs, or did occur, in some natural habitat near by.

Rosa palustris, Marsh. (Formerly referred to *R. Carolina,* L.)

Differs from most other wild roses in growing in wet places.

Known in Alabama only from a swamp west of Triana, Madison County (region 1B), where I saw it on July 20, 1922.

Rosa humilis, Marsh. (*R. Carolina,* L.?)

A low shrub, about knee-high, with large pink flowers, in late spring. Grows in dry woods. Widely distributed, but nowhere common. (More than one species may be included.)

1B. Madison and Morgan Counties. Limestone slopes of Warnock Mountain, Blount County.
1C. Lawrence County.
2A. Cullman County (W. Wolf).
2B (?). Tuscaloosa County (E. A. Smith).
3. St. Clair County (Mohr).
4. Alpine Mountain, Talladega County (Mohr). Clay County.
6C (?). Hale County (Sereno Watson, according to Mohr).
7 (?). Dallas County (Mohr).
10W (?). Wilcox County (Buckley).

Rosa laevigata, Mx. (*R. Sinica,* Ait.; *R. Cherokeensis,* Don.)
CHEROKEE ROSE.

A high-climbing vine-like shrub with evergreen leaves and large pure white flowers in March and April. Supposed to be native of China and Japan, but it was found in this country by some of the earliest explorers, and may have been introduced in some way before the time of Columbus. (See Mohr's Plant Life, pp. 54, 544.) It is certainly not native in Alabama, anyway, for it is strictly confined to unnatural habitats, especially roadsides. It is occasionally cultivated for ornament, and has been recommended for the "state flower" in this and one or two adjoining states.

6A. Near Tuscaloosa; not common.
6C. Perry, Autauga and Montgomery Counties. Probably commoner in the black belt and southward, but I have made no special note of it there, except near Richmond in Dallas County. (Mohr says "Throughout the coast plain" [his "coast plain" being not the whole coastal plain, but a small area around Mobile Bay], but gives no specific locality.)

Rosa bracteata, Wendl. (Macartney Rose.)

Resembles the preceding, and is often confused with it by persons who are not familiar with both. But it is more bushy, has more numerous and shorter leaflets, and a different calyx, and blooms about two months later. Supposed to be native of Asia.

Probably originally cultivated for ornament, but now mostly a weed, in old fields, pastures, along roadsides, etc.

1B. Near Cherokee, Colbert County. (Could the place perhaps have been named after the rose?)
3. Shelby County; especially common around Calera. Also Talladega County.
6A. Common near Tuscaloosa.
6C. Perry County.
7. Dallas, Lowndes and Montgomery Counties.
8 (?). Abundant near Carlowville, Dallas County.
13. Mobile County (Mohr).

Three other introduced roses are listed in Mohr's Plant Life, from one county each.

POMACEAE (or MALACEAE). Apple Family.

Includes about 20 genera and 600 species, trees and shrubs, mostly in the north temperate zone. Many have edible fruit (e.g., apple, pear, quince), and some are ornamental.

MALUS, Jussieu (*Pyrus*, L., in part). The Apples, etc.

Malus angustifolia (Ait.) Mx. (*Pyrus angustifolia*, Ait.) Crab-apple.

A small tree, usually less than a foot in diameter, with numerous spreading branches. Flowers pink and fragrant, in March and April; fruit ripe in fall. A somewhat variable species, and some of the Alabama crab-apples might be referred by splitters to other species, but the differences are not very marked, and they will be all treated as one for the present.

Sometimes cultivated, chiefly on account of the flowers, which besides gratifying the senses of sight and smell, are said to be a

source of honey. The fruit is hard and sour, but is often eaten raw by the fair sex, and it makes pretty good preserves and jelly. On Lookout Mountain I have been told that the tree can be used as a stock for grafting almost any sort of apples. The wood is hard, and might have some uses if there was enough of it.

Grows in dry or slightly damp woods, usually in somewhat clayey soil and in level ground. Nowhere abundant; and not conspicuous when not in bloom.

1C. Colbert County.
2A. Madison and Cullman Counties (Mohr). Lookout Mountain, DeKalb County.
2B. North of Vance, Tuscaloosa County.
3. DeKalb, Etowah, St. Clair, Jefferson, Shelby, and doubtless in all the other counties.
5. Coosa County.
6A. Elmore County.
6C. Greene, Autauga and Montgomery Counties.
7. Dallas (Mohr, Cocks) and Montgomery Counties.
8. Pike County.
10W. Butler County.
13. Mobile County (Mohr).

ARONIA, Medicus. (Choke-berry).

Aronia arbutifolia (L.) Pers. (*Pyrus arbutifolia*, L. f.)

A small thornless deciduous shrub with bright red berries resembling small haws, but not fit to eat. Blooms in March. (There are one or two related species farther north, and there may possibly be more than one in Alabama.) Said to be occasionally cultivated for ornament.

Grows in sandy bogs and wet woods, in those parts of the state where less than 5% of the area was cultivated in cotton in 1880.

2A. Cullman, Marshall and DeKalb Counties.
2B. Along Mill Creek near Democrat, Jefferson County. (15 feet tall).
4. Cheaha Mountain (Mohr).
5. Wet woods southeast of Heflin, Cleburne County (10 feet tall).
6A. Marion and Bibb Counties.
6B. Chilton and Autauga Counties.
8. Pike County.
10E. Dale and Coffee Counties.
10W. Sumter County.
13. Covington and Geneva Counties.

One of the black-fruited species should occur in Alabama, but they are not easy to distinguish when not in fruit, and I have no record of them.

AMELANCHIER, Medicus. Service-berry.

(June-berry. Shad-bush.)

Two or more species of this genus have been credited to Alabama, but the distinctions between them are obscure, and it is almost impossible to distinguish them when they are not in bloom or in fruit; so they will be treated as one for the present.

Amelanchier Canadensis (L.) Medic. (*A. Botryapium* (L. f.) DC.?)

A shrub or small leaning tree, with wood hard and heavy, but usually of too small dimensions to be of any value. It has racemes of white flowers in early spring, and is occasionally cultivated for ornament. The fruit is edible, but produced so sparingly in the southeastern states that few people ever taste it.

Grows mostly on bluffs and river-banks, and probably needs protection from fire.

1A. Along Cypress Creek near Florence.
1B. Blount County.
2A. Cullman, Marshall and DeKalb Counties.
2B. Tuscaloosa County.
3. Cherokee and St. Clair Counties.
(5. Doubtless occurs, but I never happened to notice it there. A specimen from Auburn is the type of *A. Alabamensis,* Britton.)
6A. Marion and Chilton Counties.
6C. House Bluff, Autauga County.
7. Dallas (Cocks) and Montgomery Counties.
10E. Pike County.
13 (?). Mobile County (Mohr).

CRATAEGUS, Linnaeus. The (Red) Haws.

(Hawthorns of English literature.)

Small trees, usually crooked and much branched, or shrubs; more or less thorny; with deciduous leaves, white flowers, and small, usually red, fruits, with large hard seeds (or rather nutlets). They have hard wood, but practically none of them are large enough for saw timber, and most of the species are rather scarce besides; so that the taxonomic difficulties mentioned below are of little concern to foresters and wood users. Some of the species are cultivated for ornament, and probably all of them could be. The fruit of most of them is about the size of a common grape, but rather dry and hardly worth eating, on account of the large hard seeds. A few species, however, have juicy fruit that makes excellent jelly.

The species of *Crataegus* occur in a considerable variety of habitats, but seem to prefer rather thin soils, and are most numerous in limestone regions. They are probably sensitive to fire, for most of them grow in places pretty well protected from fire. Many if not most of them are found only in clearings, pastures, old fields, along roadsides, etc., and the significance of this will be discussed farther on.

The treatment of this genus in botanical literature has undergone a remarkable development in the last few decades. Chapman's Flora of the Southern United States (first edition, 1860, second edition, 1883) enumerates only 11 species, and the sixth edition of Gray's Manual of Botany for the northeastern states (edited by Watson & Coulter, 1890) only 10 native species, 2 introduced species, and 3 varieties. In Sargent's ponderous Silva of North America (Vol. 4, 1892) it is stated that there are about forty species of *Crataegus* known, about equally divided between the Old World and the New. Fourteen species and four varieties were described from the United States, and there were said to be at least three others in Mexico. Most of the United States species listed at that time were described in the 18th century, and only one as late as 1880.

What might be called the *Crataegus* boom of the end of the 19th century may be said to have had its beginning in the description of two new species from Northwest Georgia by Dr. A. W. Chapman (then in his 83rd year) in the supplement to the rare 1892 edition of his southern Flora. One from the Rocky Mountains was described by Greene in 1896, and one from the northeastern states by Britton in 1897. Shortly after that C. D. Beadle of the Biltmore Herbarium began describing supposed new species of this genus collected by himself and assistants in various parts of the South, and Prof. Sargent did likewise with material from other parts of the country. Britton and Brown's Illustrated Flora of the northeastern states and Canada (Vol. 2, 1897) lists only 15 species (trees and shrubs), but signs of the incoming tidal wave (so to speak) were beginning to appear, and the first edition of Sudworth's Check List of trees of the United States, in the following year, enumerates about 25 (trees only).

In 1902 there appeared a supplementary volume (13) of Sargent's Silva, containing among other things descriptions of about

75 species of *Crataegus* not recognized ten years earlier, when the 4th volume of the same work was published, and a key to all the arborescent species then known in the United States, 84 in number, with the observation that there were also a few shrubby ones. Just about half the added species were described by Prof. Sargent himself, in 1901 and 1902, and more than a third of the remainder by Mr. Beadle in 1899 to 1901. Many more were added by Beadle in 1902, evidently too late for inclusion in that volume of Sargent's Silva.

Small's Flora of the Southeastern United States (1903) contains 185 supposed species of *Crataegus* (trees and shrubs), about three-fourths of them first described by Mr. Beadle, who revised the whole genus for that work. They are divided into 33 named groups, or tribes, most of which probably correspond approximately with species as understood a decade earlier. This seems to have been about the culmination of the *Crataegus* boom, and there are no more species in the second edition of Small's Flora, ten years later.

The tide seems to have begun to recede about that time, for the first edition of Sargent's Manual of Trees (1905) recognizes only 132 arborescent species of *Crataegus* in the whole United States and Canada. (Three of these grow in the Rocky Mountains and westward, and the rest from Texas eastward.) In the seventh edition of Gray's Manual (edited by Robinson & Fernald, 1908), the genus was revised by W. W. Eggleston, and limited to 65 species and several varieties (25 major varieties and about the same number of minor varieties, forms and hybrids), in 18 tribes, in the northeastern states and Canada. (Just how many of these should be classed as trees, and how many shrubs, is not apparent from the descriptions). Britton and Shafer, in their book on North American trees (1908), described only 51 arborescent species of *Crataegus* for the whole country. The second edition of Britton & Brown's Illustrated Flora (Vol. 2, 1913) lists 73 species for the northeastern states and Canada.

The last edition of A. A. Heller's Catalogue of Plants of North America north of Mexico (1909-1914) lists 957 names in *Crataegus*. This represents practically the sum of the activities of Beadle, Sargent and their predecessors, making little or no allowance for duplications.

Although very little has been done in the way of describing new species of *Crataegus* from the southeastern states since the cessation of Mr. Beadle's activities in 1902, Prof. Sargent continued to work on material from farther north, and the second edition of his Manual (1922) includes 153 species, in 22 tribes. The second edition of Sudworth's Check List (1927) enumerates nearly 200 supposedly arborescent forms (186 species and 12 varieties) of *Crataegus*, in 22 tribes. Of these forms one is escaped from cultivation, one is a horticultural variety, and one is supposed to be a natural hybrid. About 123 of them were first described by Sargent, and 36 by Beadle.

Seven of the forms listed by Sudworth are known only from Canada (though his work was intended to cover the United States only), 13 others are confined to the region of the northern manuals (Virginia to Kansas, and northward to the Arctic circle), 25 are known both north and south of latitude 36°30', 89 are confined to the southeastern states, from North Carolina to Texas (including one or two extending into Mexico), and 3 are only in the Rocky Mountains or farther west. Only about 20 of these species and varieties seem to be recorded from both east and west of the Mississippi River, and about 60 (including the 3 far western ones) from west of the river only, leaving about 118 which are only east of the river. Just about half the total number are known from only one state, and many of these perhaps only from a single station or even a single individual.

E. J. Palmer in 1925 (Jour. Arnold Arboretum 6:5-128) published a "Synopsis of North American Crataegi", including about 1,155 species, varieties, forms and hybrids, and 231 synonyms, without indicating which are trees and which are shrubs, and without undertaking the stupendous task of examining each alleged species critically to make sure that all were valid. Of the total number given specific rank, 607 were described by Sargent, 138 by Beadle, 164 by Ashe, and not more than ten by any other author. About nine-tenths of them are credited to only one state each.

The known representation of this genus in Alabama has of course increased proportionately to the developments just outlined. Of the 14 species and 4 varieties treated in Sargent's Silva

in 1892, nine species and one variety are assigned ranges extending to or through Alabama. There are probably as many in this state as in any other, and a large proportion of those discovered by the Biltmore botanists a generation ago came from Alabama.

Dr. Mohr spent the last two years of his life (1899-1901) in and around Asheville, N. C., where he was in frequent consultation with Mr. Beadle and his associates (Biltmore being a suburb of Asheville); and the treatment of *Crataegus* in his Plant Life of Alabama therefore represents the latest available information about that genus in this state at the time the book went to press (about 1900). That work lists 20 species, of which three are designated as shrubs only, while most of the others range in size from shrubs to trees. None of them are confined to Alabama. As to their distribution within the state, 9 are pretty widely distributed, 5 are chiefly northeastern, 4 northern but not specially northeastern, and 2 southern.

During Dr. Mohr's residence in Asheville Mr. Beadle published three papers on *Crataegus* (Beadle 1-3 in bibliography), in which 38 new species were proposed, most of them from Alabama, but the second and third came out too late to be utilized by Dr. Mohr. At that time the Biltmore collectors were actively exploring the southern states, and some of the results of their activities, as far as *Crataegus* is concerned, appeared in another paper by Mr. Beadle, in 1902 (Beadle 5 in bibliography), in which were proposed 31 new species from Alabama, and in his revision of the genus for Small's Flora (1903).

In the work just named 63 species of *Crataegus* (just about one-third of the total from North Carolina to Texas) are credited to Alabama. Eleven of them are called trees only, 39 trees or shrubs, and 13 shrubs only; but of course there are all gradations between trees and shrubs, and no two persons might agree on this classification. Thirty-three of the species are supposed to be confined to Alabama, while 30 are reported from one or more other states. The shrubs appear to be more local in distribution than the trees, for nearly two-thirds of them, as compared with less than half of the trees, are reported from Alabama only.

The records of their distribution within the state depend largely on the work of the Biltmore botanists (25 to 30 years ago), which

seems to have been largely concentrated in the northeastern quarter of the state; and the results might be different if every county was explored by *Crataegus* specialists; but the following figures are at least suggestive. Twelve species are pretty widely distributed in the state, 22 are chiefly northeastern, 4 northern, 11 central, 7 southeastern, 5 southwestern, and 2 southern.

In the second editions of Sargent's Manual (1922) and Sudworth's Check List (1927) only about 25 species of *Crataegus* are assigned to Alabama, 6 of which are supposed to be confined to the state. The difference between these figures and Small's 63 is due partly to the omission of the shrubby species, but mostly to a more conservative view of what constitutes a species. Nine of the 25 are pretty widely distributed in the state, 5 are northeastern, 4 northern, 4 central, and 3 southern.

If we assume that the arrangement of species by Beadle in Small's Flora is a fair indication of relationship, there is a marked tendency for related forms to inhabit the same neighborhoods (in Alabama and elsewhere). Taking the tribes in the order of the book, it appears that the Alabama species of the Tomentosae, Cordatae, Aestivales and Virides are widely distributed within and without the state, the Sargentianae are mostly northeastern, the Pulcherrimae mostly southwestern, the Euflavae mostly northeastern, the Visendae, Integrae, Dentatae, Attritae, Anisophyllae and Recurvae mostly southeastern, and so on. Of course further exploration and study might necessitate some modification of these statements, but the tendencies shown are worth bearing in mind. It happens that the first four tribes here named consist largely of long known and easily recognized species; but it is possible that the splitting process simply has not been carried as far in those groups as in the others, and at some future time they too may be divided into many ill-defined "species" of limited range. On the other hand a conservative person might claim that the tribes are the real species, and the alleged species in them nothing but varieties, caused by slight differences in habitat; in which case there would be nothing surprising about similar forms occurring in the same regions.

The enormous multiplication of *Crataegus* species calls for some comment. Very likely those who first described them be-

lieved they were perfectly good species, with well-defined taxonomic and geographical limits; and it is possible that many of them are; but the reduction in number of recognized species after 1903 seems to indicate that the splitting process had been carried too far. But even in the latest treatments of the genus, which are conservative in comparison with those of 25 years ago, the named forms can hardly be regarded as species in the same sense as most of our pines and oaks, for example. They are probably more nearly analogous to the innumerable horticultural varieties of roses, sweet peas, chrysanthemums, etc. The distinctions between them are often very finely drawn, depending on such trivial characters as the number of stamens, color of anthers, and slight differences in the shape or color of the fruit. (There is possibly no person living who could name correctly even half of the 153 *Crataegus* figures in Sargent's Manual if they were removed from the text.) And even if these rather obscure characters were invariable it seems impossible for one who does not devote most of his time to this one genus to remember enough of them to identify all the supposed species without a book; and furthermore, it is necessary to see both flowers and fruit to be sure of the identity of many of the species, and that means visiting the same tree at least twice at intervals of a few months or longer, and makes it impossible to list the species seen on a reconnaissance trip, as can be done with nearly all other trees.

It is quite likely that many of the supposed species of *Crataegus*, especially those known from only one individual, are hybrids; but that cannot be proved without breeding experiments, which would take several years for each species. Another possibility is that they have originated by mutation or otherwise in the last hundred years or so, since a large part of the country was cleared up. For a great many of them, as indicated a few pages back, are known only from old fields, pastures, roadsides, etc., which could hardly have existed before the white man came.*

It happens that the writer has never succeeded in identifying any of the *Crataegus* forms described in the last 35 years, having

*See Bull. Torrey Bot. Club 35:354-355, 357. 1908. This question is also discussed or touched upon by Sargent in Jour. Bot. (London) 45:290. Aug. 1907; H. B. Brown in Bull. Torrey Bot. Club 37:251-260, 1910, and L. M. Standish in Jour. Heredity, June 1916.

been occupied most of the time with other researches that seemed easier or more important. Only the more easily recognized species therefore are listed below; but a reader who is sufficiently interested can get information about others from the works of Mohr, Small and Sargent, already mentioned.

The easily recognized species are about as follows:

Crataegus viridis, L. (*C. arborescens*, Ell.?)

An upright thorny tree, sometimes a foot in diameter and 40 feet tall, with fluted trunk and smoothish scaly bark. Probably our largest haw tree. Blooms in March and April. Fruit small and scarcely edible. According to Prof. Sargent the wood is heavy, hard, compact, and takes a fine polish; but I find no record of its ever having been utilized in Alabama.

Grows in damp flatwoods and alluvial bottoms, mostly in the coastal plain.

1B. Madison, Limestone and Morgan Counties.
3. Jefferson, Shelby and Talladega Counties.
6A. Chilton and Elmore Counties.
6C. Montgomery County.
7. Hale (Mohr), Sumter, Dallas, Montgomery and Bullock Counties.
8. Pike County.
9. Sumter County.
10W. Wilcox County (Buckley).
11 (?). Clarke County (Mohr).
13. Conecuh River swamp southeast of Brewton.
14. Occasional in upper part of the delta.

Crataegus spathulata, Mx. (Sugar) Haw.

A small tree with crooked and fluted trunk, usually branching low down, and smooth bark, cinnamon-red in patches where freshly exposed by the scaling off of the thin light brown outer layers. (In this respect it resembles the bark of the cultivated crepe myrtle, and more remotely that of the sycamore.) Flowers small and numerous, in April and May. Fruit abundant and showy, but too small to eat.

This haw is sometimes cultivated for ornament, but it has no other use as far as known, except perhaps as food for birds.

Grows mostly in dry woods, preferring clayey soil, which may be flat and "poorly drained", as in the case of the crab-apple. Not abundant in Alabama.

1B. Morgan (Mohr) and Franklin Counties.
1C. Colbert County.
2A. Cullman (Mohr) and DeKalb Counties.
2B. Walker, Fayette, Jefferson and Tuscaloosa Counties.
3. Seen in most of the counties, and probably occurs in all.
5. Elmore County. Lee County (Mohr). Very likely in all the other counties too.
6A. Greene, Tuscaloosa and Elmore Counties.
6C. Hale, Autauga (Mohr) and Macon Counties.
7. Greene, Hale, Dallas and Montgomery Counties.
10W. West of Myrtlewood, Marengo County, and near Allenton, Wilcox County.

Crataegus apiifolia (Marsh.) Mx. (*C. Marshallii* Eggleston.) (Parsley Haw)

A tall shrub, tree-like in form, but with trunk seldom more than three inches in diameter. Occasionally cultivated for ornament.

Grows mostly in the coastal plain, in shaded bottoms and on river-banks.

1B. On Beaverdam Creek, Limestone County, and Flint Creek, Morgan County.
2A. Cullman County (Mohr).
2B. Jefferson and Tuscaloosa Counties.
3. Talladega County.
5. Lee County (Baker & Earle). North of Eclectic, Elmore County.
6A. Tuscaloosa County.
7 (?). Hale, Dallas and Montgomery Counties (Mohr).
10W. Choctaw County.
11. Conecuh County.
12. Geneva County.
14 (?). Mobile and Baldwin Counties (Mohr).

Crataegus Crus-Galli, L. (*C. Mohri,* Beadle?)

What I take to be this species is a small tree with rather thick shining leaves which one might believe to be evergreen if not seen in winter. It has rather large dull red fruit.

Grows in calcareous soils, often a little damp, as in flatwoods and prairies.

1B. Madison, Morgan and Franklin (?) Counties.
3. DeKalb, Jefferson and Shelby Counties.
7. Greene, Hale (Mohr), Dallas and Montgomery Counties.
8. North of Linden, Marengo County.
10W. Near Allenton, Wilcox County.

Crataegus Michauxii, Pers.

What I take to be this species is a crooked tree, sometimes nearly a foot in diameter, with rough blackish bark, drooping branches, and somewhat wedge-shaped grayish scurfy leaves.

Grows in dry but moderately fertile sandy soils, often in old fields, apparently confined to the coastal plain.

6B, 6C. Autauga County.
7. Sand near Selma.
10E. Pike, Barbour and Dale Counties.
13. Baldwin County.

Crataegus rufula, Sarg. (Formerly included in *C. aestivalis* (Walt.) T. & G., from which it perhaps does not differ much.*) MAY HAW.

A small low-branched tree with brownish bark, differing from all other haws in Alabama in having tender juicy fruit ripening in May. This fruit makes a beautiful red jelly, which seems to be scarcely known outside of the regions where the tree is indigenous.

Unlike our other haws, this grows in shallow ponds and sloughs, where the water fluctuates a few to several feet with the seasons. In Alabama it is chiefly confined to a few of the southernmost counties.

12. Washington, Covington and Houston Counties.
13. Washington (Mohr), Monroe and Escambia Counties.
14. David's Lake and Pierce's Landing, Mobile County (Mohr).

Crataegus uniflora, Muench.

One of the smallest of all our haws; a thorny shrub often only two or three feet high. The fruit remains green for a long time. It has no known use, except that it has been offered for sale for ornamental purposes.

Grows in dry woods, or occasionally in old fields, etc. Not very common.

2A. Jackson County (Harbison). Cullman County (Mohr).
2B, 6A. Tuscaloosa County.
6C. Autauga and Montgomery Counties.
10W. Along L. & N. R. R. north of Searcy, Butler County.
12. Covington County.
13. Mobile County (Mohr).

Crataegus armentalis, Beadle.

A low shrub, similar to the preceding, except that it is still smaller, and has red fruit.

Grows in rocky woods in the plateau region. Originally described from Marshall County, and pointed out to the writer by W. Wolf in Cullman County in September, 1927.

*See Sargent, Jour. Arnold Arboretum 1:248-252. 1920.

DRUPACEAE (or AMYGDALACEAE). Plum Family.

About 10 genera and 125 species, trees and shrubs, mostly in the northern hemisphere, chiefly noted for their edible fruits (almond, peach, apricot, plum, cherry, etc.), but some yield lumber, medicine, and other products, and some are ornamental.

CHRYSOBALANUS, L. (*Geobalanus*, Small).

Deer Plum. Gopher Apple. Ground Oak.

Chrysobalanus oblongifolius, Mx.

A low almost unbranched shrub, usually less than a foot high, with stiff shiny pale green reticulated leaves which are evergreen or nearly so, small white flowers in June, and rather large and showy but uneatable fruits which ripen about September. It has a network of underground stems, and often grows in patches of considerable size. Its economic properties are unknown.

Common in dry sandy long-leaf pine forests in the lower counties, where less than 1% of the area was planted in cotton in 1880. This species, unlike most other shrubs, is indifferent to fire, for when the tops are burned off the roots soon send up new shoots, ready to bloom in a few weeks or months.

11 (?). Claiborne, Monroe County (Mohr).
12. Geneva and Covington Counties.
13. Common throughout.

PRUNUS, L. The Plums, Cherries, etc.

This genus formerly included the almonds, peaches and apricots, which are now put in a separate genus, *Amygdalus*. The choke-cherries are put by some authorities in *Padus* and the evergreen species with inedible fruit in *Laurocerasus*, but we have so few of those that it is simpler to retain them in *Prunus* for the present. In this genus, as in *Rubus* and *Crataegus*, several species of questionable validity have been described in late years from old-field specimens; but four or five native species are about all that can be readily identified in Alabama. The latest monographic treatment of *Prunus* proper is that of Wight, cited in the bibliography, and the interested reader is referred to that for further particulars.

The species of *Prunus* (in the broader sense) range in size from shrubs to trees. Most of them have edible fruits, and in some species (prunes, plums, cherries) this has been developed by cultivation in an important commercial product. The ash of the trees is said to be exceptionally poor in silica, but just what this signifies is not clear. Most if not all of the species grow only in places pretty well protected from fire.*

Prunus Americana, Marsh.

Wild (or Canada) Plum. Prairie Plum.

A small tree, usually only a few inches in diameter and about ten feet tall, with rough flaky brownish bark a little different in color from that of any other native plum, by means of which it is easily recognized in winter. It blooms in March and April, and ripens its fruit in late summer. The fruit is hardly fit to eat when raw, but can be made into preserves; and it is said to be capable of improvement by cultivation. The tree is said to make an excellent stock for grafting exotic plums onto, and it is sometimes cultivated for ornament.

Grows in rich woods, especially on limestone outcrops and in calcareous flatwoods. Nowhere abundant.

1A (?). Lauderdale County (Mohr).
1B. Colbert, Madison, Marshall and Blount Counties.
2A. Cullman County (Mohr).
2B. Tuscaloosa County.
3. Jefferson, Bibb, Shelby and Talladega Counties.
4. Clay County (Mohr).
7. Pickens, Sumter, Greene, Autauga and Bullock Counties.
10W. Wilcox County.

Prunus lanata (Sudw.) Mackenzie and Bush.

A species closely related to the preceding, and perhaps easily confused with it. Its known range is chiefly from Indiana to Texas (something like the pecan), but Wolf finds it in Cullman County, and Prof. Cocks reports it as common near Hatcher's Bluff in Dallas County.

Prunus hortulana, Bailey, a species originally described from cultivated specimens, and still not well understood, was reported by Dr. Mohr† from shell banks in the southern part of Mobile County (region 15); but according to Wight and others its range is entirely north and west of Alabama; so it is very likely that Dr. Mohr mistook something else for it.

*See Rhodora 18:201-203. Sept. 1916.
†Bull Torrey Bot. Club, 26:118, 1899; Plant Life of Ala., p. 551.

Prunus angustifolia, Marsh. (*P. Chicasa,* Mx.)
Wild Plum. (Chickasaw Plum.)

A shrub or small tree, growing usually in clumps or small thickets. The flowers appear before the leaves in March, and the fruit, which is either red or yellow, about an inch long, and good to eat, either raw or preserved, ripens in May or June, according to latitude and season.

This species is supposed to have been introduced by the Indians from somewhere farther west, but its natural range and habitat (if any) have never been discovered. It grows in old fields and fence-rows, nearly throughout the South outside of the mountains, and seems to be most abundant in the regions that have been cultivated the longest.

In Alabama it is common in regions 1B, 3, 5, 6C, 7, 8, and 10E, and rare or unknown in 1A, 2A, 4, 6B, 12, 14 and 15.

Prunus umbellata, Ell. Hog Plum. (Sloe).

A small tree, blooming in February and March. The fruit ripens in midsummer or later, and is smaller than that of *P. angustifolia,* and hardly fit to eat.

Grows in dry woods and hammocks, mostly in the coastal plain. Not common.

7. Along Catoma Creek 5 miles southwest of Montgomery. Near Hatcher's Bluff, Dallas County (Cocks).
10E. Pike and Coffee Counties.
10W. or 11 (?). Clarke County (Mohr).
12. Geneva County.
13. Mobile, Baldwin and Escambia Counties (Mohr).

Prunus injucunda, Small, reported from Alpine Mountain, Talladega County, by Mohr (Bull. Torrey Bot. Club 26:118. 1899), and *P. mitis* Beadle (Biltmore Bot. Stud. 1:162. 1902), described from Lee County, are regarded by Wight and later writers as mere varieties of *P. umbellata.* They may however be as distinct as some of the alleged species of *Crataegus.* Mr. W. W. Ashe reports finding *P. mitis* about 5 miles east of Moundville, Hale County, in August, 1926.

Prunus serotina, Ehrh. Wild Cherry.

A well-known tree, sometimes of medium size or larger, but often blooming and bearing fruit when quite small. The flowers appear with the leaves in March and April, and the fruit is ripe by June.

It is sometimes planted for ornament, and two horticultural varieties have been named. The wood is one of the choicest for cabinet-making, interior finish, scientific instruments, etc., but, as in the case of the black walnut, practically all the best trees have been used up, and there is very little of the wood on the market now. The bark, collected in the fall and dried, is officinal. It has tonic and sedative properties, and an infusion of it is efficacious in pulmonary complaints, and for that reason it is an ingredient of various cough medicines. The leaves when partly wilted are said to be very poisonous to cattle. The flowers furnish honey. Birds are very fond of the fruit, and it can be eaten right from the tree by mankind, but is better when made into jelly. The seeds, like most other parts of the plant, contain a little prussic acid, and for that reason it is best not to swallow them.

For additional information about this species see Circular 94 of the U. S. Forest Service.

The wild cherry grows naturally on bluffs and in ravines and hammocks, where it is pretty well protected from fire. Like several other trees with similar habitats, it is inclined to become a roadside weed (its seeds being dropped along fences by birds) in some parts of its range, especially northward. It is comparatively scarce in natural habitats, and the following are the only indigenous localities for it that I have noted in Alabama:

1B. Colbert County.
2B. Walker and Tuscaloosa Counties.
5. Clay, Coosa, Chilton and Elmore Counties.
6A. Chilton and Elmore Counties.
6C. Along Alabama River, Elmore and Montgomery Counties.
7 (?). Second bottoms at Lock 8 on Warrior River, Hale County.
10E. Pike and Coffee Counties; rare.
12. Along Pea River near Geneva.

Prunus australis, Beadle. (Biltmore Bot. Studies 1:162, 1902.)

A tree something like the preceding, but smaller, and said to differ chiefly in having the leaves broader, and rusty-tomentose beneath. Described in 1902 from "clay soil at Evergreen," Conecuh County (region 11?), and not yet known elsewhere, though according to Mr. Ashe it is common enough around there. Whether it grows only in clearings, or in some natural habitat, does not seem to be on record.

Prunus Alabamensis, Mohr. (*P. Cuthbertii*, Small?, *P. serotina neomontana*, Sudw.?)

Whether the names in the preceding line belong to one, two or three species is not certain; but I am inclined to apply them all to a small tree with leaning or crooked trunk, differing from *P. serotina* in these characters, and also in having blunter leaves with rusty hairs along the midribs beneath, and in being more tolerant of fire.

It grows on rocky slopes of mountains in the northeastern quarter of the state (and in Georgia).

3. Jefferson and Talladega Counties (Mohr, as *P. Alabamensis*).
4. Calhoun, Talladega and Clay Counties. Cheaha Mountain (Mohr, as *P. serotina neomontana*).

The next species belongs to the section *Laurocerasus* (*Leptocarya*, Nutt.), which is regarded by some as a distinct genus. It differs from *Prunus* proper in having evergreen leaves, small flowers, and small black inedible or even poisonous fruit.

Prunus Caroliniana (Mill.) Ait.

Mock Orange. (Laurel Cherry. Wild Peach.)

A handsome evergreen tree, usually below medium size, with small white flowers in early spring, and dry black poisonous berries ripening in fall. It is a favorite ornamental tree in yards and parks in the South, and is sometimes trimmed to hedge form. The flowers may furnish some honey, but nearly all parts of the tree are poisonous if eaten (but not to the touch).

Its natural habitat seems to be bluffs and hammocks, well protected from fire; but it is rare in the wild state, and many if not most of the specimens seen outside of cultivation may have had cultivated ancestors, and have sprung from seeds dropped by birds.

2B. Bluffs on Warrior River a few miles above Tuscaloosa.
7. Dallas and Montgomery Counties.
10E. In the pocosin, Pike County.
10W. West of Myrtlewood, Marengo County.
11. Conecuh County.
13. A few miles above Tensaw (Bartram). Mobile County (Mohr).
15. Some large old trees on a shell island in the bay 12 miles from Mobile (Tuomey, 1850).

The next three families were formerly treated as one (Leguminosae), and they do have certain characteristics in common, especially the leguminous pods and the possession of nodules full of nitrogen-fixing bacteria on their roots; but they differ considerably in flower structure.

MIMOSACEAE. Mimosa Family.

About 75 genera and 1600 species, mostly shrubs and trees, in warm, dry regions, such as Mexico, Asia Minor, South Africa, and Australia. Many are ornamental.

ALBIZZIA, Durazzini.

Albizzia Julibrissin (Willd.) Durazz. "Mimosa."*

A small to medium-sized tree with leaning or widely branched trunk, smooth gray bark, feathery twice-compound leaves, which fold up at night, and small fragrant flowers with long pink stamens in dense spherical clusters suggesting powder-puffs, in May and June.

Native of Asia, commonly cultivated for ornament, and escaping into fields and woods around cities and old settlements in Talladega, Tuscaloosa, Hale, Autauga, Clarke, Monroe, Butler, Henry, and doubtless other counties, mostly in the southern half of the state.

VACHELLIA, Wight & Arnott.

Vachellia Farnesiana (L.) Wight & Arn. (*Acacia Farnesiana*, Willd.) (Opopanax. Huisache.)

A shrub or small tree, with small compound leaves, and small feathery balls of fragrant yellow flowers. Cultivated for ornament in warm climates, and frequently escaped along the west side of Mobile Bay, according to Mohr. Supposed to be native in the West Indies, southern Florida, and Texas.

CAESALPINIACEAE. Senna Family.

About 110 genera and over 1,000 species, trees, shrubs and herbs, widely distributed, the trees mostly tropical. Many are ornamental, and some are medicinal. Quite a number of the herbs are weeds.

CERCIS, L. (Judas Trees)

Cercis Canadensis, L. Redbud.

A small leaning or crooked tree, seldom more than a foot in diameter and thirty feet tall, with deciduous heart-shaped leaves,

*This common name belongs properly to the herbaceous genus *Mimosa* (sensitive plants) in the same family, but it is now in pretty general use in the South for this tree.

very handsome when covered with pink-purple flowers (exactly the color of peach blossoms) in March, before the leaves appear. The wood is of a rich brown color, and takes a good polish, but is usually of too small dimensions to be of any commercial importance. The tree is often cultivated for ornament, and there is said to be a double-flowered variety of it. The flowers furnish honey, and the bark of the root is supposed to have some medicinal properties.

Grows in rich woods, especially in limestone regions.

1A. Limestone County.
1B. Colbert, Franklin, Madison, Morgan, Marshall, and probably all the other counties; common.
1C. Colbert and Morgan Counties.
2A. Cullman, Marshall, DeKalb and Blount Counties.
2B. Walker, Jefferson and Tuscaloosa Counties, mostly on shaly bluffs.
3. Common throughout.
5. Cleburne, Clay, Coosa, Chilton, Elmore, and probably scattered in all the other counties.
6A. Fayette, Tuscaloosa and Elmore Counties.
6C. Elmore and Montgomery Counties.
7, 8. Common.
10E. Pike, Coffee and Covington Counties.
10W, 11. Common.
1. On limestone outcrops in Covington and Houston Counties.

GLEDITSIA, Linnaeus (formerly spelled *Gleditschia*).

The Honey Locusts.

Gleditsia triacanthos, L. (Honey) Locust.

(Fig. 54)

A medium-sized or large very thorny tree with compound deciduous leaves, small greenish but fragrant flowers in spring, and long flat crooked brown pods in fall. This is recommended as an ornamental tree, but is better for hedges, on account of its formidable compound thorns. The wood has a limited use for fence-posts, hubs, etc. The flowers furnish honey, and the pulp in the pods is eaten by domestic animals and small boys.

This appears to be native in bottoms and on limestone outcrops in the Tennessee Valley, and on some of the richer soils in the black belt and farther south, all the way to the upper part of the Mobile delta. But most of the specimens seen at the present time are along roadsides and in clearings (somewhat as in the case of the black walnut, but more so), so that it is difficult to deter-

FIG. 54. Very thorny trunk of *Gleditsia triacanthos*, 17 inches in diameter, on limestone slope about a mile west of Lim Rock, Jackson County. March 15, 1913.

mine its natural distribution. Some of the roadside specimens may have been purposely planted, but others may have sprung up from seeds dropped by animals.

G. aquatica, Marsh. (*G. monosperma,* Walt.), a similar-looking but smaller tree, with small one-seeded pods, has long been known in Georgia and Mississippi, and in other states farther east and west, but there seems to be absolutely no record of it for Alabama, which is rather surprising. Possibly the forms east and west of here are really distinct species; but if not, it may be found in Alabama some time.

PARKINSONIA, Linnaeus. (Palo Verde)

Parkinsonia aculeata, L.

A small tree, with narrow pinnate leaves and yellow flowers. Occasionally cultivated for ornament, and rarely escaping around Mobile, according to Mohr. Native of the tropics.

LEGUMINOSAE proper (or **FABACEAE**). Pulse or Pea Family.

A large family of world-wide distribution, with about 350 genera and over 1,000 species, containing many useful and ornamental and a few poisonous plants. In yield of food and fodder it is exceeded only by the grasses. Its representatives in temperate regions are mostly herbs, but there are in Alabama two trees and eight or ten shrubs and vines.

Cladrastis lutea (Mx.) Koch. (*C. tinctoria,* Raf.)

CLADRASTIS, Rafinsque. (Only one species.)

Yellow-wood.

(Fig. 55)

A small to medium-sized tree, with smooth bark, brittle branches, deciduous pinnate leaves with large alternate leaflets, and white flowers in April and May. The largest specimens I have seen are about 14 inches in diameter and 50 feet tall, near Lock 14 on the Warrior River. It seems to bloom and fruit rather sparingly in Alabama.

Occasionally cultivated for ornament. The wood yields a yellow dye.

Grows mostly on rich rocky bluffs along rivers.

1A. Along Tennessee River at Sheffield, Colbert County (M. C. Wilson). Seen in 1922 on south bank of Mussel Shoals, a few miles farther upstream, but probably now drowned out by the Wilson Dam.

FIG. 55. Trunk of *Cladrastis*, about a foot in diameter, on rich bluffs facing north, on Warrior River near Lock 14, about 13 miles above Tuscaloosa. Photograph by H. E. Wheeler, September 3, 1926.

2B. Frequent on shaly bluffs on left side of Warrior River from the western corner of Jefferson County (formerly Squaw Shoals, now Lock 17) down to about eight miles above Tuscaloosa. (See Jour. Elisha Mitchell Sci. Soc. 37:157. 1922.)

10W. A few small specimens on the high bluff at Claiborne, Monroe County.

AMORPHA, Linnaeus. (FALSE INDIGO).

Shrubs, with deciduous pinnate leaves, and spikes of small bluish flowers which have only one petal. Several species have been described in recent years, but they all look much alike, and I am not sure that I have identified them correctly.

Amorpha fruticosa, L.

A shrub with deep violet-colored flowers, in April and May. Occasionally cultivated for ornament in the North.

Grows mostly on banks of rivers and creeks, and especially in limestone regions.

2A. Along Calvert Prong of Warrior River, Blount County.
2B. Jefferson and Tuscaloosa Counties.
3. Cherokee, Etowah, Calhoun, Talladega and Jefferson Counties.
5. Rocky banks of Tallapoosa River above Tallassee, Elmore County.
6A. Tuscaloosa County.
7. Sumter, Marengo and Dallas Counties.
8. Marengo and Dallas Counties.
9. Black Bluff on Tombigbee River, Sumter County.
10W. Wilcox County.
11. Clarke and Washington Counties.
12. Geneva County.
14. Lower part of Mobile delta. (*A. glabra?*)

Amorpha virgata, Small.

Resembles *A. fruticosa* in general appearance, but has quite a different habitat, growing in dry woods, mostly on mountains. Blooms in May.

1B or 2A. "Jackson County, wooded ridges at Gurley's, 1200 feet" (Mohr). (Gurley is in Madison County, but not far from Jackson. If Dr. Mohr's station was on limestone slopes it was in region 1B, but if on the sandstone of the Coal Measures higher up it was in 2A.)
4. Calhoun, Talladega and Clay Counties.
5. Cleburne County. On rocky slopes near Coosa and Tallapoosa Rivers in northern part of Elmore County. (These last possibly *A. fruticosa.*)

A. glabra, Desf., is reported by Dr. Mohr from swamps and marshes near Mobile (region 14 or 15).

A. montana, F. E. Boynton, and *A. Tennesseensis,* Shuttl., are said by F. E. Boynton (Biltmore Bot. Studies 1:138,140. 190) to occur in Alabama, but no localities are specified. One growing along Eight-mile Creek in Cullman County is identified as *A. Tennesseensis* by Wolf.

WISTERIA, Nuttall.* (*Bradleia,* Adans., *Kraunhia,* Raf.)

Wisteria frutescens (L.) Poir. (Wild) Wisteria.

A woody vine with deciduous pinnate leaves, and racemes of light blue flowers, in April. Looks much like the common cultivated (Asiatic) wisteria, but is smaller, and has fewer flowers. It is said to be occasionally cultivated.

*This genus was named after Prof. Caspar Wistar, and should have been spelled *Wistaria.* That spelling has been used in some books, but the modern practice is to stick to the original spelling unless it is too obviously a misprint.

Grows in swamps and on river-banks, mostly in the coastal plain.

1A. South side of Mussel Shoals, Colbert County.
2B. Jefferson and Tuscaloosa Counties.
6A. Tuscaloosa County.
6C. Montgomery County.
10W. Wilcox County.
11. Choctaw and Clarke Counties.
12. Geneva County.
14. Mobile County (Mohr). Lower part of the delta.

DAUBENTONIA, DeCandolle. (No common name.)

Daubentonia longifolia (Cav.) DC. (*D. punicea* DC.; *Sesbania Cavanillesii,* Wats.)

A large woody herb or short-lived shrub, about six feet tall, with pinnate leaves and showy racemes of red or yellow flowers, in summer. (The name *D. punicea* has been applied to the red form and *D. longifolia* to the yellow form, but they do not seem to differ in any other respect, and they are here treated as one species.) Probably native of Mexico. Occasionally cultivated for ornament. Said to be poisonous to sheep. (See Marsh in bibliography.)

Runs wild along and near the Gulf coast from Apalachicola westward, especially in Texas, where it appears almost like a native. Dr. Mohr found it in several places around Mobile, and I have seen a little of it in Montgomery County.

ROBINIA, Linnaeus. The Locusts.

Robinia Pseudo-acacia, L. (Black) Locust.

A medium-sized tree, seldom more than a foot in diameter and 40 feet tall in Alabama, with furrowed dark brown bark, deciduous pinnate leaves, and racemes of fragrant cream-colored flowers, in late spring. The heart-wood is dark-colored, very heavy, hard, strong and durable, and is used largely for fence-posts, cross-ties and telegraph poles farther north, especially around New York, where it is not native, but is commonly cultivated, and escaped along roadsides, etc. It is not abundant enough in Alabama to be of much importance, but I have been told that in Madison County a good deal of the wood has been made into insulator pins, for which purpose it is considered superior to all other American woods. It also makes good fuel. The tree is often cultivated for ornament or shade, and 16 horticultural varieties have been listed.

The bark of the root possesses tonic and emetic properties, but is not officinal.

On account of its being cultivated in many places, and its tendency to spread to roadsides, clearings and thickets, it is not easy to determine the natural range of this species. Its original habitat seems to be rocky (especially calcareous) woods and river banks, where the soil is moderately fertile and fire is infrequent. It is not as common in Alabama as in the mountains farther north, and the following are all the indigenous localities known for it at present.

1A. On limestone near Elkmont, Limestone County, and bluffs on south side of Mussel Shoals, Colbert County. On Tennessee River, Lauderdale County.

1B. On Smithers Mountain and Monte Sano in Madison County, and along the Tennessee River in Jackson County. On mountain slopes, Morgan County.

2A. On Monte Sano, Madison County, Sand Mountain, Marshall County, Warnock Mountain, Blount County, and Chandler Mountain, St. Clair County.

3. Limestone slopes of Lookout Mountain, DeKalb County.

4. Calhoun, Talladega and Clay Counties.

5. Bluff on Big Sandy Creek, Tallapoosa County.

6C or 7. House Bluff, Autauga County.

It also runs wild in a few places in the coastal plain, which is rather unusual, for most plants, or at least most trees, do not seem to thrive even in cultivation, south of their natural range.

Robinia viscosa, Vent.

A shrub or small tree, with pale pink flowers. Rare in the wild state, but occasionally cultivated. Three horticultural varieties have been described.

Grows in dry woods on the mountains.

2A. Near Mentone, on Lookout Mountain, DeKalb County (Mohr).

4. Cedar Mountain, Clay County (if identified correctly).

Robinia hispida, L.

A low shrub, with showy pink flowers. Planted for ornament, like the preceding. Habitat about the same as for *R. viscosa.*

4. On Cheaha Mountain, the highest point in the state (Mohr).

Robinia Boyntoni, Ashe.

A shrub, little known, and perhaps not very different from the preceding.

2A. Cullman County (W. Wolf). About 5 miles from Albertville, Marshall County (Harbison).

RUTACEAE. Rue Family.

About 100 genera and 1,000 species, mostly aromatic shrubs, growing in the warmer parts of the world. Includes the various citrous fruits, and several medicinal and ornamental plants.

XANTHOXYLUM, Linnaeus. (Including *Fagara*, L.)

(Prickly Ash, etc.)

Xanthoxylum Clava-Herculis, L. (*X. Carolinianum*, Lam.)

(Toothache Tree. Pillenterry.)

A small tree, aromatic and prickly, with glossy deciduous pinnate leaves, and small greenish flowers, blooming in April.

Sometimes cultivated for ornament or shade. The bark is an active stimulant, and as such enters into the composition of various medicines. The berries are also medicinal, but not officinal.

Grows mostly in dry calcareous or phosphatic soil, protected from fire, in the coastal plain. Escaped from cultivation in many places, so that its natural range is uncertain. Nowhere common, except perhaps near the coast.

6A. (?). Tuscaloosa County (Mohr).
6C. Near Montgomery; perhaps not native.
7. Hale, Marengo, Dallas and Montgomery Counties (Mohr). Calcareous creek bottoms about 3 and 7 miles south of Eutaw, Greene County. Chalk bluffs near Demopolis. Used for firewood around Gallion (P. S. Bunker).
10W. On limestone, Wilcox County.
11 (?). Clarke County (Mohr).
15. Mobile and Baldwin Counties (Mohr).

Xanthoxylum Americanum, Mill. (Northern Prickly Ash)

A prickly shrub, with dull green leaves. The bark is officinal, like that of the preceding species.

2B. Shale bluffs on Hurricane Creek near its mouth, Tuscaloosa County. Also near Lock 14, a few miles farther up the Warrior River. Very rare in Alabama. Otherwise known only from Georgia and northward.

PTELEA, Linnaeus. (Hop Trees).

Ptelea trifoliata, L.

A shrub or rarely a small tree, with ternate deciduous leaves, greenish flowers in April, and wafer-like fruits about an inch in diameter, in terminal clusters. Sometimes cultivated for ornament. One horticultural variety has been named. The bark,

leaves and fruits are bitter and tonic, and used in some places in domestic medicine, but they are not officinal.

Grows on cliffs, river-banks, and in dry calcareous woods, protected from fire; not common. Sometimes associated with *Staphylea trifolia*, which it somewhat resembles.

2B. Cliffs on Hurricane Creek, and on Warrior River about ten miles above Tuscaloosa (like the preceding species).

3. Limestone hills near Attalla and Lagarde, Etowah County. Bibb County (Mohr).

4. Rocky brow of Cedar Mountain, Clay County.

5. Clay and Tallapoosa Counties (Earle). Rocky banks of Tallapoosa River above Tallassee, Elmore County.

6C or 7. House Bluff, Autauga County.

7. Along Catoma Creek, Montgomery County. Dallas County ("30 feet tall," Cocks).

10W. Along Pursley Creek near Estelle, Wilcox County. Bluffs along Alabama River at Lisbon, Clarke County (Mohr), and Claiborne, Monroe County.

Ptelea microcarpa, Small, is credited to Alabama by its author, but the Alabama specimens he saw cannot be separated from *P. trifoliata*.

SIMARUBACEAE. Quassia Family.

About 30 genera and 150 species, trees and shrubs with bitter bark, in the warmer parts of the world.

AILANTHUS, Desfontaines.

Ailanthus altissima (Mill.) Swingle. (*A. glandulosus*, Desf.) (Tree of Heaven.)

A stout but more or less crooked tree, with long pinnate deciduous leaves and clusters of small greenish ill-scented flowers, in May. Often cultivated for shade, but has nothing to recommend it except rapid growth, for it is a coarse, cheap-looking tree, and the ill-scented flowers make it a nuisance for a few weeks every spring. It is said to be only the male flowers that smell, though, and if only female trees were planted that objection would be removed.

Native of China. Escapes from cultivation around some of our cities and towns, in much the same manner as *Broussonetia*, already described, but much less abundant than that species. (It seems to be commoner farther north, even around New York City.) In low woods near Bear Swamp in Autauga County it grows tall and straight like a native forest tree.

MELIACEAE. Mahogany Family.

About 40 genera and 600 species, trees and shrubs, nearly all tropical. Several are valuable for their wood (e.g., mahogany and "Spanish cedar"), and some are cultivated for ornament.

MELIA, Linnaeus.

Melia Azedarach, L. Chinaberry.* (Umbrella Tree.)

A small to medium-sized tree, with short more or less crooked trunk and spreading branches, yellowish-brown heart-wood, glossy dark green compound deciduous leaves, fragrant purple flowers in rather large clusters, in March and April, and straw-colored berries which hang on most of the winter.

A favorite shade-tree in city and country throughout the cotton belt, especially among the negroes;† planted as far north as Cape Charles, Virginia, and west to Arizona, southern California, and northern Mexico. It grows rapidly and makes a dense shade, and is much less objectionable than *Broussonetia* and *Ailanthus*. The preferred form is the var. *umbraculifera* (umbrella china), which divides into numerous spreading branches a few feet from the ground. It is remarkably free from insect enemies; and it is believed by some that grass will grow under a chinaberry tree better than under most other trees.

The wood, on account of its color, has some uses, but it is not available in large enough pieces or sufficient quantities to be important. The bark has some medicinal properties. The flowers yield honey. The berries when full-grown but still hard and green are favorite ammunition for popguns; and the ripe seeds, which are large and fluted and easily pierced endwise, make beads that can be readily dyed any color. The ripe berries are said to intoxicate birds that feed on them.

---

*This is its usual name throughout the South, but northern writers, especially those who have never seen it growing, usually ignore this name entirely and call it "Pride of India," or "China tree." The name "chinaberry" does not appear in Small's Flora, nor even in the catalogue part of Mohr's Plant Life of Alabama, which was edited in Washington when he was too old and infirm to look after it properly. Some writers who know it by name only have confused it with *Sapindus*, which is called "wild china" in the books. In California it is commonly called "umbrella tree." Uneducated people often call it "chaneyberry."

†I have seen negro houses shaded with it even in California.

Native of Asia. Long cultivated in this country, and running wild in old fields, along fence-rows, in moderately rich woods, etc., mostly in the southern half of the state. (The variety *umbraculifera* either does not run wild much, or else it reverts to the ordinary form when left to itself long enough.) Occasional in the Coosa Valley and Piedmont region, common in the black belt and western red hills (where negroes are most numerous), and scattered in other parts of the coastal plain.

EUPHORBIACEAE. Spurge Family.

A large family, with 250 genera and over 4,000 species, growing mostly in dry or rich soils and in warm climates. Includes quite a number of ornamental, medicinal and poisonous plants, and weeds, as well as a few food plants. Many of the species have milky juice, which in certain tropical trees is an important

Fig. 56. *Croton Alabamensis* on dry shale bluff of Warrior River, facing west, about ten miles above Tuscaloosa. Photograph by Walter B. Jones, June 21, 1928.

source of rubber. Most of the species in temperate regions are herbs, but Alabama has three native shrubs and one introduced tree, besides several cultivated species.

CROTON, Linnaeus.

(Figs. 56, 57)

Croton Alabamensis, E. A. Smith.

An evergreen shrub covered with close-fitting scales, which have a silvery appearance on the under sides of the leaves. Flowers inconspicuous, mostly in February and March. The plant has some ornamental value, and Dr. Smith, the discoverer, had it growing in his yard at the University for many years, but it is so rare that it is little known, and is not handled by horticulturists at all.

This is one of the rarest shrubs in the United States, and there is little likelihood of its ever being found growing wild outside of Alabama. It was first discovered by Dr. Smith in 1877, on dry limestone rocks (Silurian) along the Cahaba River near Pratt's Ferry (long since replaced by a bridge) in Bibb County (region 3). This locality was visited by Dr. Mohr in 1882 and by the writer in 1906 and 1924. The plant is rather abundant there, forming small dense thickets, which are said to be known locally as "privet brakes." In December, 1905, I found it on shaly cliffs on the left side of the Warrior River about ten miles above Tuscaloosa (region 2B); and on many subsequent visits it has been found to be fairly common along that river for a mile or two, but apparently no farther. Specimens from there have been transplanted to the University campus, where they have been growing for several years.

References:—Plant World 9:106. 1906; Jour. Elisha Mitchell Sci. Soc. 37:157, 159. 1922; Mohr 6, 9; Plant Life of Ala. 93-94, 591, pl. 5.

STILLINGIA, Linnaeus.

Stillingia aquatica, Chapm. (No common name.)

An erect shrub several feet tall, branched above the middle, with yellowish finely toothed willow-like deciduous leaves, and spikes of small yellowish apetalous flowers, blooming all summer. Stems about an inch in diameter at the base, rapidly tapering up-

FIG. 57. Near view of leaves and flowers of *Croton Alabamensis* on University campus. Walter B. Jones, March 27, 1926.

ward. The wood when dry is lighter than cork, but it is not abundant enough in Alabama to be known or used for anything.

Grows in shallow ponds in the lower part of the coastal plain. Common in several such places between Orange Beach and Oak, in the extreme southern part of Baldwin County (region 13). Not known west of Florida until seen there (June 13, 1912).

SEBASTIANA, Sprengel.

Sebastiana ligustrina (Mx.) Muell. Arg.

(No common name.)

A shrub, something like the preceding, but slenderer and greener. Blooms in May and June. Economic properties unknown.

Grows in low hammocks, creek and river bottoms, etc.; almost confined to the coastal plain.

2B. Along North River at crossing of Watermelon Road, Tuscaloosa County.

5. Along the two large rivers in Elmore County, about seven miles above Wetumpka and a mile or two above Tallassee.

6A. Pickens, Tuscaloosa, Chilton and Elmore Counties.

6C. Greene, Hale and Autauga Counties.
7. Montgomery County, and perhaps all the others too.
8. Marengo and Pike Counties.
9. Sumter County.
10E. Pike, Crenshaw, Coffee and Dale Counties.
10W. Sumter, Choctaw, Marengo, Monroe and Butler Counties.
11. Choctaw, Clarke and Conecuh Counties.
12. Washington, Houston and Geneva Counties.
13. Near Conecuh River east of Brewton and Flomaton, Escambia County. Mobile County (Mohr).

SAPIUM, P. Browne.

Sapium sebiferum (L.) Roxb. (Chinese Tallow Tree.)

A small tree, with leaves much like those of some species of *Populus,* and spikes of small greenish apetalous flowers in spring. Fruit small, dry, with three oily seeds. Most of the plant is poisonous, but the seeds are said to be used in some parts of China as a substitute for tallow.

Native of China or Japan; occasionally cultivated for ornament, and escapes sparingly around Mobile (Mohr) and other southern seaports.

EMPETRACEAE. Crowberry Family.

A very small family, with three genera and five species, all evergreen shrubs, in temperate regions.

CERATIOLA, Michaux. (Only one species.)

Ceratiola ericoides, Mx. (Sand-hill) Rosemary.

A much-branched shrub 1 to 6 feet tall, with slender erect branches, short awl-like evergreen leaves much like those of the northern spruces, and inconspicuous flowers and fruits. It has no known use, though it might be used for decorative purposes if there was enough of it, and it would be very ornamental if it could be cultivated.

Grows in the poorest white sands, where earthworms are unknown and the vegetation is too sparse to carry fire. (Commonest in Florida).

13. Washington and Mobile Counties (Mohr). Sandy ridges west of Mobile (Tuomey).
15. Old dunes south of Bon Secour (Tuomey) and Orange Beach. Baldwin County.

ANACARDIACEAE. Sumac or Cashew Family.

About 60 genera and 400 species, trees, shrubs and vines, mostly tropical. Some are cultivated for ornament, some have edible fruit (e.g., mango and cashew), some are medicinal, and some poisonous.

COTINUS, Adanson. (Smoke-trees).

Cotinus Americanus, Nutt. (*Rhus cotinoides,* Nutt.)
"Chittim-wood"* (Yellow-wood.)

(Figs. 58-61)

A small irregular tree, usually six or eight inches in diameter and about twenty feet tall, with brownish scaly bark and simple leaves. The flowers are small, in feathery clusters, and appear in spring, about the time the leaves are full grown. The whole plant is pervaded with a sumac odor, and it was formerly classed as one of the sumacs (*Rhus*). The branches break or split off very readily, and it is unusual to find a tree, either wild or cultivated, without long scars on the trunk from this cause.

Like the south European smoke-tree or Venetian sumac (*Rhus Cotinus*), which it closely resembles, this is sometimes cultivated for ornament, more as a curiosity than anything else, for it is not particularly handsome. Although this is one of the rarest trees in North America, its wood is or has been used for one of the commonest purposes, namely, fuel. I saw a whole wagon-load of it, cut into stove lengths, in the streets of Huntsville in the spring of 1906, but I was informed that it was not usually burned alone, but mixed with other woods. Its price was about the same as that of any other stove-wood. But as it grows in places which are almost impossible of cultivation, it is not likely to be exterminated very soon. The heart-wood is dark and very durable, and is said to have been used for fence-posts. An orange dye can be extracted from it, and this fact is said to have caused the destruction of the most accessible trees during the Civil War.†

*There seems to be a widespread belief among the people of Madison County that this is identical with the "shittim wood" of the ancient Hebrews, but that is quite unfounded. Our tree does not even belong to the same family, and it is confined to the United States.

†See Sargent's Silva, 3:4. 1892.

FIG. 58. Base of trunks of clump of *Cotinus* (the largest about a foot in diameter) on limestone slope of Monte Sano near Taylorsville, Madison County. March 17, 1913.

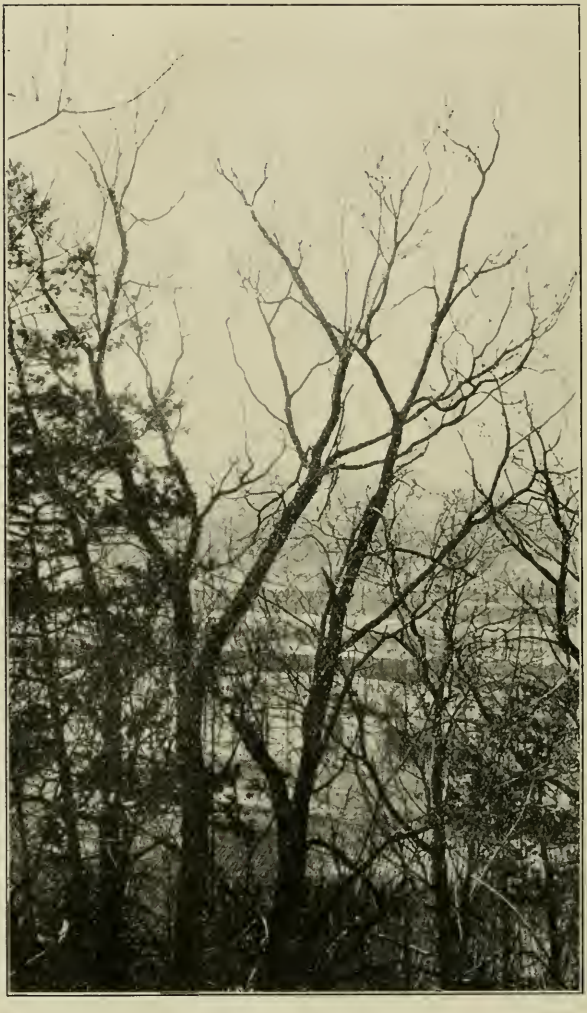


FIG. 59. Tops of same trees as in preceding picture, looking toward Tennessee River. At left is a cedar, leaning away from the deciduous trees, like the evergreen oaks in Figs. 38 and 39.

FIG. 60. *Cotinus* on limestone, north slope of Valhermosa Mountain, in northeastern part of Morgan County. September 28, 1927.

References:—Buckley 2, Mohr 2, 6; Sargent, Garden & Forest 4:340. 1891.

Known in Alabama only on dry slopes of Bangor or Mountain Limestone in the eastern part of the Tennessee Valley. The first botanist to report it from Alabama was S. B. Buckley, who found it in April, 1842, on the south side of the Tennessee River, presumably in Morgan County, and on the "Bailee place" near New Market, Madison County, but apparently did not publish the fact until about forty years later. It was re-discovered at the latter place in 1882 by Dr. Mohr, who found it also near Gurley and

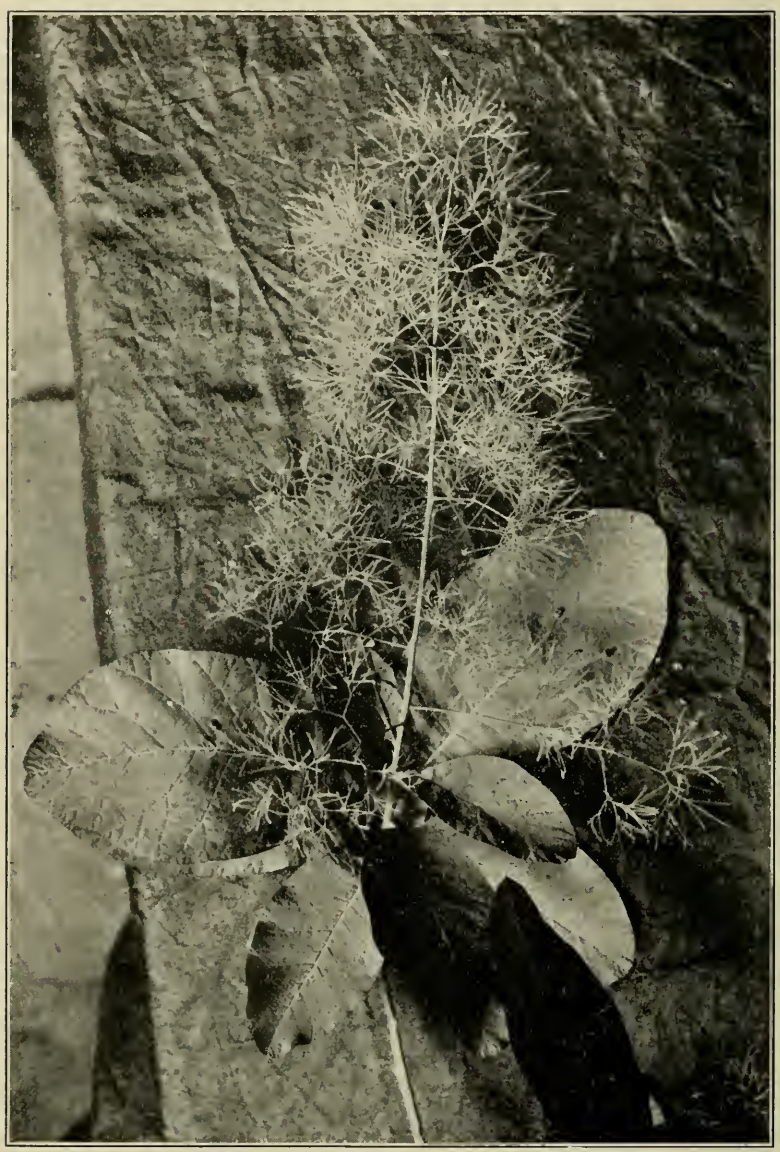


FIG. 61. Leaves and flowers of *Cotinus Americanus,* from a tree planted by Dr. Eugene A. Smith in his yard at the University. Photograph by Walter B. Jones, May 22, 1926.

on Monte Sano.* I have found it locally abundant on rocky slopes of the mountains east of New Market, Huntsville, and Taylorsville, all in Madison County, and in Morgan County east of Cotaco Creek.

Prof. Sargent said of it in his Tenth Census report on forests (vol. 9, p. 52. 1884) "In Alabama nearly exterminated"; but amended that in the last volume of his Silva (14:99. 1902) by saying that it was still common near Huntsville. There ought to be a good deal of it yet in the comparatively unexplored mountains of Jackson County, as well as in Madison and Morgan.

RHUS, Linnaeus. The Sumac(h)s.

Strong-scented shrubs or small trees, with pinnate leaves, and fuzzy red berries in dense terminal clusters. (The poison sumacs, with whitish berries in loose clusters, and the sweet sumacs, with early flowers and trifoliate leaves, formerly put in *Rhus*, are now treated as separate genera.)

Rhus copallina, L. (Black) Sumac.

Usually a shrub, but sometimes a small tree 6 inches in diameter and 25 feet tall, or even larger. Blooms in midsummer. Clusters of fruit brick red, drooping in winter.

Sometimes cultivated for ornament, or at least offered for sale by nurserymen. The leaves are astringent, and have been used in the mountains for tanning and dyeing. Its medicinal properties are probably very similar to those of the next species.

Grows in dry open woods, and often spreads to old fields, clearings and roadsides. It seems to be able to stand a moderate amount of fire, for it often grows in long-leaf pine forests, though it does not attain a large size there. Common nearly throughout the state, but avoids the richest and poorest soils. Noted in every region except 8 and 14, and there is no known reason why it should

*Dr. A. Gattinger in his Flora of Tennessee (1901) says that Dr. Mohr found it in Limestone County, but that must be a mistake. Several works on trees give as one locality for it the "Cheat Mountains" of Tennessee; but I have never been able to locate any such mountains on any map, or to discover who was responsible for that report. There seems to be no other record of its occurrence in Tennessee, but as it grows within a few miles of that state, it would not be at all surprising to find it north of the state line. Outside of Alabama it is known from a few places in Missouri, Arkansas, Oklahoma and Texas.

not grow in the former, except that several plants which seem to like iron are scarce there, and this may be one of that category.

Rhus glabra, L. (White, or Red) Sumac.

Resembles the preceding in size and general appearance, but the twigs and under side of the leaves are covered with a waxy coating, it blooms a month or two earlier (May and June), and the clusters of fruit are bright red, and erect. It is just as ornamental, or perhaps a little more so. A decoction of the berries is acid and astringent, and is officinal in the U. S. Pharmacopoeia. The leaves and bark are non-officinal drugs. In DeKalb County I have been told that the bark of the root is used in poultices.

Grows in moderately dry and rich soils, protected from fire; oftener along roadsides, etc., than in natural habitats. Widely distributed over the state, but commonest northward. Its known distribution south of the black belt is as follows:

8. Wilcox and Barbour Counties.
9. Wilcox County.
10E. Barbour County.
10W. Wilcox, Clarke, Monroe and Butler Counties.
11. Clarke and Conecuh Counties.

Some years ago Dr. E. L. Greene (see bibliography) subdivided *Rhus glabra* into what he considered 29 distinct species. One of those, *R. atro-virens*, was based on a single collection (habitat not stated) from the vicinity of Gadsden. How many other of these alleged species are to be expected in Alabama it is impossible to say; but their status is at present very doubtful, something like the *Crataegus* forms already mentioned.

Rhus typhina, L., the northern "staghorn sumac," is said by Prof. Sargent (Silva 3:16. 1892) to extend south to central Alabama; but that is probably an error, for it has never been verified.

SCHMALTZIA, Desvaux. (The Sweet Sumacs).

Slender shrubs, with the odor of *Rhus*, but with leaves ternate, and yellowish flowers in small clusters, appearing before the leaves in early spring. The berries are much like those of *Rhus*. These plants are not poisonous, but look much like some of the poisonous species in the next genus.

Schmaltzia aromatica (Ait.) Small. (*Rhus aromatica*, Ait.)

Grows 3 to 6 feet tall, and has velvety leaves. Sometimes cultivated for ornament; recommended for rock gardens. The bark of the root is a non-officinal drug.

Grows mostly on dry hillsides of limestone or shale, in the northern half of the state.

1B. Common on limestone slopes, Jackson, Madison, Morgan, Colbert, Franklin, Marshall and Blount Counties.
2A. Near Calvert Prong of Warrior River northwest of Chepultepec, Blount County.
2B. Common on Warrior River bluffs about ten miles above Tuscaloosa.
3. Lookout Mountain (Mohr). Blount County.
4. Summit of Cheaha Mountain (Mohr).

Schmaltzia crenata (Mill.) Greene. (Described in his Leaflets, 1:128. 1905.)

Differs from the preceding in being only about half as tall, and having smooth leaves.

Grows in dry woods in the coastal plain; rather rare.

6C. South of Tuskegee, Macon County.
10E. Near Ozark, Dale County (Mohr).
12. Dry woods about 4 miles southwest of Hartford, Geneva County.

TOXICODENDRON, Miller. The Poison Sumacs, etc.

Small trees, shrubs or vines, with pinnate or ternate leaves, flowers much like those of *Rhus*, but berries smooth, greenish white, in loose axillary clusters. The plants are very poisonous to the skin of most people.

Toxicodendron pinnatum, Mill. (*Rhus Vernix*, L.; *R. venenata*, D.C.)
(Thunderwood, Poison Dogwood, Poison Elder.)

A large shrub or small tree, resembling the true sumacs in habit, with smooth bark, and smooth pinnate leaves. Blooms in late spring. Although very poisonous, its juice has been used for lacquer or black dye.

Grows in sandy bogs, non-alluvial swamps, etc., mostly where less than 5% of the area was cultivated in cotton in 1880. Rarely seen in or near the Tennessee Valley and black belt.

2A. Cullman County (Mohr).
3. Near Woodstock, Bibb County.
4. Swampy place in saddle between Cedar Mountain and the main Blue Ridge, Clay County.
6. Fayette, Pickens, Tuscaloosa and Chilton Counties.
6B. Autauga County.
7. Dallas County (Cocks).
10E. Pike and Coffee Counties.
6. Fayette, Pickens, Tuscaloosa and Chilton Counties.
11. Clarke County.
12. Washington County.
13. Common in all the counties, except perhaps Escambia.

Toxicodendron goniocarpum, Greene.* (*Rhus radicans*, L., in part). Poison Ivy.

A well-known vine, with smooth ternate deciduous leaves, attaching itself to rocks, trees, fence-posts, etc., by innumerable rootlets, and climbing often to the tops of trees. Stems occasionally three inches in diameter (Fayette County), but usually less than an inch. Blooms in May.

This is one of the commonest and best known poisonous plants in North America. All parts of it contain a non-volatile oil, toxicodendrol, which produces an intense irritation of the skin, causing small blisters, which usually last several days. Some people are immune to it, though, and cattle seem to eat the leaves with impunity. The fresh leaves were formerly officinal in the U. S. Pharmacopoiea.

References:—Grant & Hansen, McAtee.

Grows in rich woods and swamps, and occasionally along fences and in yards (not as frequently here as around New York, though). Like nearly all other woody vines, it seems to require almost complete protection from fire; which suggests a method of eradicating it where its presence is not desired. It is common in nearly all parts of the state.

1A. Along Tennessee River, Colbert County.
1B. Limestone slopes, etc., Madison and Morgan Counties.
1C. Colbert, Lawrence and Morgan Counties.
2A. Cullman, Marshall, Blount and Etowah Counties.
2B. Walker, Jefferson and Tuscaloosa Counties.
3. Frequent throughout.
5. Cleburne, Clay, Coosa and Elmore Counties.
6A. Frequent throughout.
6B. Bibb and Autauga Counties.
6C. Greene and Hale Counties.
7. Frequent.
8. Marengo and Pike Counties.
10E. Pike and Coffee Counties.
10W, 11. Frequent.
12. Geneva County.
13. Escambia and Covington Counties.
14. Common in upper part of the delta.

Toxicodendron quercifolium (Steud.) Greene.* (*Rhus Toxicodendron*, L., in part). Poison Oak.

A much smaller plant than the preceding, growing erect and about two feet tall, with leaflets thicker, coarsely toothed, and

*Leaflets, 1:127. 1905.

sometimes a little hairy. Probably a little less poisonous than the other species. Blooms in May.

Grows in dry sandy or rocky woods, subject to occasional fires, usually associated with long-leaf pine, in regions where less than 1% of the area was cultivated in cotton in 1880.

1C. Colbert County.
2A. Blount and Etowah Counties.
2B. Jefferson, Shelby and Tuscaloosa Counties.
3. On chert and sandstone ridges, Talladega and Jefferson Counties.
4. Calhoun, Talladega and Clay Counties.
5. Chilton County.
6A. Tuscaloosa County.
6B. Rather common throughout.
6C. Autauga County.
9. Sumter County.
10E. Barbour and Coffee Counties.
10W. Mountains near West Butler, Choctaw County.
12. Covington, Geneva and Houston Counties.
13. Clarke County.

CYRILLACEAE. Tyty Family.

Includes three genera and about a dozen species, small trees or shrubs, in the warmer parts of America.

CYRILLA, L. Tyty. (Also spelled Titi and Tighteye).

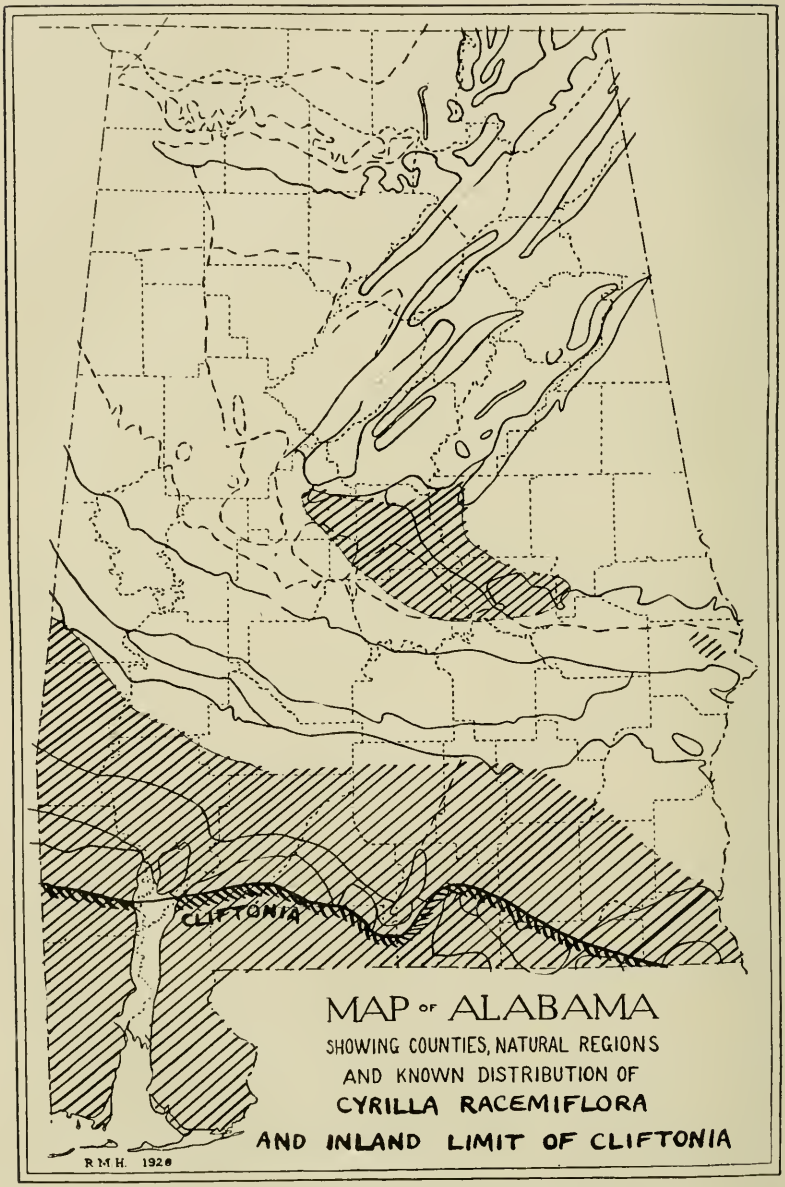
Cyrilla racemiflora, L.

(Map 20)

A large shrub or small tree, with crooked trunk, sometimes 8 inches in diameter, partly evergreen leaves, and racemes of small white flowers in June and July. It would probably be cultivated for ornament if it was better known. It is one of the important honey-yielding plants.

Grows in branch and creek swamps, with moderately rich but not calcareous soil, in and near the coastal plain. (See map.)

5. Coosa, Chilton and Elmore Counties. Lee County (Baker & Earle).
6A. Bibb, Chilton, Autauga and Elmore Counties.
6B, 6C. Autauga County.
7. Near Hatcher's Bluff, Dallas County (Cocks).
8. Pike County.
10E. Crenshaw, Coffee, Dale and Covington Counties.
10W. Sumter, Choctaw, Clarke, Monroe and Butler Counties.
11. Choctaw and Conecuh Counties.
12, 13. Common throughout.
15. Near Fairhope and Orange Beach, Baldwin County.



Map 20. Approximate distribution of *Cyrilla racemiflora* and inland limit of *Cliftonia*.

CLIFTONIA, Banks. (Only one species).

Cliftonia monophylla (Lam.) Sarg. (*C. ligustrina* (Willd.) Spreng.) TYTY.

(Map 20)

A handsome shrub or small tree, with a maximum diameter of about 8 inches, and a height of about 35 feet, but usually less than half those dimensions. The leaves are glossy and evergreen, and the flowers are white, in small erect clusters (suggesting candles on a Christmas tree), appearing in March and April, and followed by small sharply three-angled fruits in fall.

Small specimens are sold by nurserymen for ornamental purposes. Both Sargent and Mohr state that the wood makes excellent fuel, but I never saw any of it cut for that purpose. Prof. Stelle recommends it for shuttles, and in Georgia it used to be used for hames. The flowers are an important source of honey.

Grows in sour non-alluvial swamps, free from mud, lime and sulphur, in the lower parts of the coastal plain, where the summers are rainy and less than 1% of the area was cultivated in cotton in 1880. Often forms dense thickets or "bays."

12. Covington and Geneva Counties, and perhaps Houston.
13. Abundant, especially in Mobile and Escambia Counties.
15. Near Orange Beach, Baldwin County.

AQUIFOLIACEAE. HOLLY FAMILY.

Includes four or five genera and about 300 species, trees and shrubs, mostly evergreen, and mostly in Central and South America. Some are cultivated for ornament, and some furnish honey, medicine, etc.

ILEX, L. HOLLY, etc.

Ilex opaca, Ait. (COMMON, OR AMERICAN) HOLLY.

A well-known evergreen tree of medium size, usually a foot or less in diameter; but on the Tombigbee River in Sumter County I have seen specimens about a foot and a half in diameter and 60 feet tall. Blooms in April.

Often planted for ornament, especially in the South. The branches with red berries are much used locally for wreaths and Christmas decorations, and also shipped north in large quantities.

(It has been nearly exterminated in this way in some of the northern states.) The wood is white, hard, close-grained, and easy to work, and is therefore useful for cabinet-making, interior finish, woodenware, scroll-work, brush-handles, inlaying, carving, chessmen, etc. The leaves, bark and berries have some medicinal properties, but are not officinal. The leaves are sometimes eaten by cattle.

Grows in various places protected from fire, such as bluffs, ravines, hammocks, and the drier parts of river and creek bottoms. Usually in non-calcareous soils. Common nearly throughout the state; least so in the Tennessee Valley, black belt, and Mobile delta, and most in regions 6A and 10W, apparently.

Ilex Cassine, L. (*I. Dahoon,* Walt.)

(Dahoon Holly.) Cassena.

An evergreen shrub or small tree, blooming in April and bearing red berries in winter. Ornamental, but economic properties unknown.

Grows in non-alluvial swamps in the lower parts of the coastal plain. Rare in Alabama. Dr. Mohr found it near Stockton and Mobile, and I have seen it near Point Clear.

Ilex myrtifolia, Walt.* (Yaupon.)

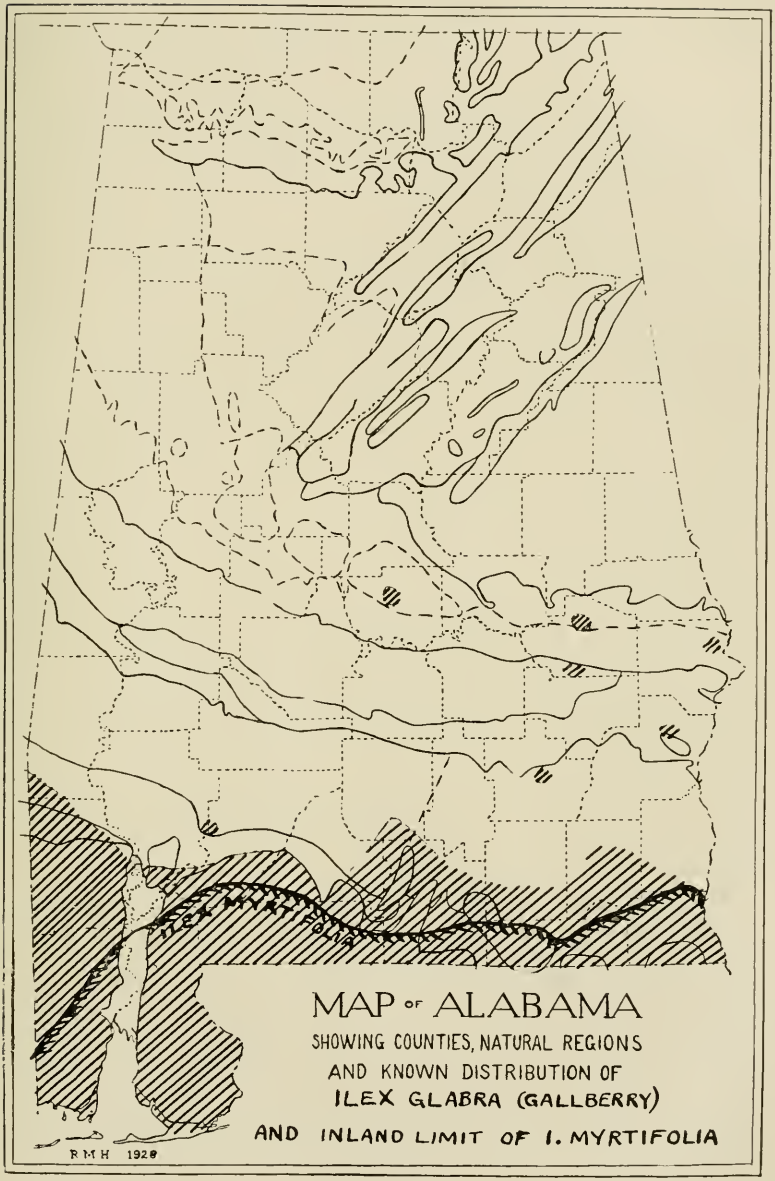
(Map 21)

A handsome little evergreen tree or large shrub, with crooked trunk, smoothish gray bark, small stiff pointed evergreen leaves, and red (rarely yellow) berries. The wood is similar to that of *I. opoca,* but too little known and usually of too small dimensions to be of any importance. The leafy branches with berries are used to some extent for winter decorations, in the regions where it grows. Grows in shallow ponds in the pine woods, in the lower parts of the coastal plain.

12. Common throughout.
13. Occurs in all the counties, but less common.†

*This is treated by some authors as a variety of *I. Cassine,* on account of the supposed occurrence of intermediate forms. But it has a different range and habitat, and I have never seen any intermediate forms. It seems just about as distinct a species as any we have (in genera containing two or more).

†The little crooked tree shown on Plate 21 of Dr. Eugene A. Smith's report on the undergrounnd waters of Alabama (published by the State Geological Survey in 1907) is probably of this species.



Map 21. Approximate distribution of *Ilex glabra* and inland limit of *Ilex myrtifolia*.

Ilex vomitoria, Ait. (*I. Cassine,* Walt.)

Y(A)UPON, OR CASSENA.

A shrub or small tree, with stiff twigs and soft scalloped evergreen leaves about an inch long, and red berries. It makes an excellent ornamental plant, and is also used for Christmas decorations like some of the other evergreen species of *Ilex*. The leaves possess stimulant (and perhaps emetic) properties, and contain more caffeine than any other North American plant, as far as known, being nearly equal to tea leaves in that respect. (It is a near relative of the *mate* or Paraguay tea, a favorite South American beverage, which has similar properties.) Its properties were well known to the Indians, who made a beverage known as "black drink" from it, and had more or less ceremony connected with the use of it. It has been used like tea by white settlers along the southern coast in the past, but that custom seems to be now practically obsolete, except on Knott's Island, in Virginia and North Carolina, where nearly every farmer has a patch of yaupon in his yard, and puts up a barrel or so of it every year. The twigs are usually gathered in spring, chopped up with the leaves, and dried by artificial heat, so rapidly that they are scorched. When wanted for use a handful or so is put in a tea-kettle, with water, left on the stove indefinitely, and the decoction poured out when called for.

A good deal has been written about this plant at various times, the most accessible paper perhaps being that by Power and Chesnut, cited in the bibliography.

It is almost confined to the coastal plain, in hammocks and other places protected from fire, and in soils ranging from nearly pure sand to nearly pure limestone (but probably free from earthworms or nearly so). Like several other "pyrophobic" plants with fleshy fruits, it often finds its way to roadsides, etc., where the seeds are dropped by birds, so that its natural range is not accurately known. It is scattered rather sporadically, being abundant in some places and absent from others which appear perfectly suited to it.

6A. Along Big Sandy Creek, Tuscaloosa County. Pasture thickets just north of Tuskegee.

6C. Along and near Autauga Creek, from Prattville to its mouth; also in second-growth woods between Booth and Autaugaville.

7. Greene County. Dallas County (Cocks).
10E. Abundant along and near Pea River in Coffee County.
10W. Marengo and Butler Counties.
11. Choctaw County.
12. Geneva County.
13. Covington, Escambia and Baldwin Counties.
15. Mobile County (Mohr). Abundant on Petit Bois Island (A. H. Howell, oral communication), and near Fairhope and Orange Beach.

Ilex decidua, Walt.

A deciduous shrub or small tree, with leaning or crooked trunk. Grows 7 inches in diameter and 25 feet tall on the Conecuh River in Pike County, but usually considerably smaller. Blooms in April, and has red berries, much like those of the evergreen species. Sometimes sold by nurserymen for ornamental purposes.

Grows in alluvial bottoms and on calcareous uplands, mostly in the coastal plain.

1B. In southwestern Madison County, on Limestone Creek in Limestone County, and on Flint Creek in Morgan County. Near Falkville (Mohr).
1B or 2A. On Mulberry Fork of Warrior River, Blount County (Mohr).
2A. On Sipsey Fork, Winston County (Mohr).
2B. On Hurricane Creek, Tuscaloosa County.
3. Along Coosa River near Stemly, Talladega County.
5. Along Tallapoosa River above Tallassee, Elmore County.
6A. Tuscaloosa and Elmore Counties.
6C. Near Alabama River, Montgomery County.
7. Greene, Dallas and Montgomery Counties. In prairies, Hale County. On Tombigbee River near Demopolis, Marengo County.
8. Along Conecuh River, Pike County.
11. Along Murder Creek near Evergreen.
12. Along Pea River near Geneva.
13. Along Murder Creek near Brewton.
14. Near Mt. Vernon and Stockton (Mohr).

Ilex longipes, Chapm.

A deciduous shrub with red berries. Not well known.

2A. Cullman County (Mohr, Wolf). Common around Albertville (Harbison).
10W. Wilcox County (Buckley). Clarke County (Mohr).

Ilex ambigua (Mx.) Chapm. (*I. Caroliniana* (Walt.) Trel.)

A deciduous shrub. Grows in dry sandy and rocky places. Blooms in April.

6B. Tuscaloosa and Autauga Counties.
13. On sandstone rocks a few miles west of Bay Minette, Baldwin County. On sandy banks, Mobile County (Mohr).

Ilex verticillata (L.) Gray. (Black Alder.)

A large deciduous shrub, with red berries.

Grows in wet woods and along small streams. Not common in the South.

2A. Cullman County (Mohr, Wolf). Jackson County (Harbison). DeKalb and Cherokee Counties.
4. Clay County.
6A. Tuscaloosa County.
6B. Autauga County.
7 (?). Montgomery County (Mohr).
13 or 14. Stockton, Baldwin County (Mohr).
A variety (*padifolia*) has been identified in Cullman County by W. Wolf.

A few other deciduous shrubby red-berried species have been reported from various places in Alabama, but they are not well understood. Among them are *I. monticola,* Gray, and its variety *mollis,* Britton (*I. mollis,* Gray), reported by Dr. Mohr from regions 2A and 5, and *I. Beadlei,* Ashe, reported by Mr. Harbison from Marshall County.

The next two species have evergreen leaves and bitter black berries, and were put in a separate genus (*Prinos*) by Linnaeus, but have long been included in *Ilex* by most authors.

Ilex coriacea (Pursh) Chapm. (*I. lucida,* T. & G.)

An evergreen shrub with shiny black berries. Resembles the next, but is usually larger, sometimes ten or fifteen feet tall, and has broader leaves with sharper teeth. Blooms in spring. Nothing definite is known about its economic properties, but it probably yields honey, like the next.

Grows in wet woods and sour swamps; confined to the coastal plain or nearly so.

5 (?). Lee County (Baker & Earle).
6B. Autauga County.
6C. Very common in Bear Swamp, Autauga County. (See Torreya 24:82. 1924.)
10E. Pike, Coffee and Dale Counties.
10W (?). Conecuh County.
12 (?). Geneva County.
13. Washington, Mobile, Baldwin, Escambia and Covington Counties.

Ilex glabra (L.) Gray. *(Prinos glaber,* L.) GALLBERRY.*

(Map 21)

An evergreen shrub, a few feet tall, with small white flowers in spring, and dull black bitter berries persisting through the winter. Sold by nurserymen for planting along borders, etc. The bushes are often tied together in small bundles to make brooms for sweeping yards. The flowers are an important source of honey, and the berries are sometimes used medicinally by country people.

Grows in sour sandy places, such as low pine lands and edges of swamps, in the non-calcareous portions of the coastal plain. Fire does not seem to hurt it much, for when burned it soon sends up new shoots from the roots.

6B. Autauga County. Elmore County (Mohr).
6C. Near Tuskegee, Macon County.
7. Flat pine woods about a mile west of Fort Davis, Macon County.
8. Near Comer, Barbour County.
10E. Scattered throughout.
10W. Butler, Monroe and Clarke Counties.
11. Choctaw and Washington Counties.
12. Common throughout.
13. Abundant throughout.
15. Mobile and Baldwin Counties.

CELASTRACEAE. STAFF-TREE FAMILY.

About 45 genera and 400 species, trees, shrubs and vines, widely distributed. Some are ornamental and some medicinal.

EUONYMUS, Linnaeus. (Originally spelled *Evonymus;* perhaps a misprint.)

Euonymus Americanus, L. (STRAWBERRY BUSH.)

A slender shrub, with four-angled green stems, leaves evergreen or nearly so, greenish flowers in April, and bright red warty fruits with large red seeds in fall. Ornamental, if nothing else.

Grows in rich woods, ravines, hammocks, etc., where fire is rare or impossible. Frequent, but not abundant.

1A. Along Cypress Creek near Florence.
2A. Blount and Cherokee Counties.
2B. Walker and Tuscaloosa Counties.

*It is known exclusively by this name by millions of people in the South, but just because it happens to be called "inkberry" in some northern states (where it is far less abundant), one finds no mention of "gallberry" in manuals of southern plants written in the North, nor even in some dictionaries; and the latter name does not even appear in the catalogue part of Mohr's Plant Life of Alabama, which was edited in Washington. (It does appear, however, on page 821, which perhaps did not get the same editorial attention as the rest.)

3. DeKalb, Blount and Talladega Counties.
4. Calhoun and Coosa Counties.
5. Clay County (Mohr). Coosa, Randolph and Chilton Counties.
6A. Franklin, Tuscaloosa, Chilton and Elmore Counties.
6C. House Bluff, Autauga County.
7 (?). Montgomery County (Mohr).
10E. Dale County.
10W (?). Clarke County (Mohr).
11. Choctaw, Washington and Conecuh Counties.
13. Mobile and Baldwin Counties (Mohr).

Euonymus atropurpureus, Jacq., a species which sometimes grows larger, and is of some medicinal value, and occasionally cultivated for ornament, Dr. Mohr was told was indigenous near Gurley, Jackson County, but this has probably never been verified. In 1922 I saw what I took to be this species on the north side of Mussel Shoals in Lauderdale County, but it may have been drowned out since by the Wilson Dam. In the spring of 1928 I found a few specimens on limestone on the north slope of Warnock Mountain, in Blount County, and in rich woods near the Alabama River north of Montgomery.

CELASTRUS, Linnaeus. (False Bittersweet. Waxwork.)

Celastrus scandens, L.

A deciduous woody vine with reddish fruits, which burst open in the fall and display a few large bright red seeds. Often gathered or cultivated for ornament in the North, where it is commoner than with us. The bark, especially of the root, has medicinal and nutritive properties, but is not officinal.

1B. On a small limestone knob near Cedar Plains, Morgan County.
2A. Reported from near Mentone on Lookout Mountain by Dr. Mohr.

SAPINDACEAE. Soapberry Family.

About 125 genera and over 1,000 species, mostly trees and shrubs of the Old World tropics. Several are ornamental, and a few have edible fruit.

SAPINDUS, Linnaeus.

Sapindus marginatus, Willd. (Soapberry. Wild China.*)

A small tree, said to be native in Florida, Texas, Mexico, etc. Occasionally cultivated for ornament or shade, and escaped near Gallion and Mobile, according to Dr. Mohr.

*Some writers on economic botany have confused this with the chinaberry (*Melia Azedarach*), probably on account of not finding the prevailing southern name of that in the books. See remarks under that species, and also under *Ilex glabra*.

STAPHYLEACEAE. Bladder-nut Family.

About 5 genera and 22 species, trees and shrubs, widely distributed. A few ornamental.

STAPHYLEA, Linnaeus.

Staphylea trifolia, L. (Bladder-nut.)

A shrub, or rarely a small tree, with opposite ternate deciduous leaves, whitish flowers in April, and balloon-like pods in fall. Sometimes cultivated for ornament in the North.

Grows on rich bluffs, river-banks, etc.; often with *Ptelea trifoliata*, which it somewhat resembles.

1A. On Tennessee River near Florence (M. C. Wilson), and Plymouth Rock Landing, Morgan County.

1B. Base of Sand Mountain, Jackson County (Harbison).

2B. Shale cliffs on left side of Warrior River at several places a few miles above Tuscaloosa.

3. Limestone hill near Lagarde, Etowah County.

5. Along Coosa River, Chilton County.

7. Along Catoma Creek between W. Ry. of Ala. and L. & N. R. R., Montgomery County. Some of the largest specimens on record.* (Seen there in 1906 and 1927.)

10W. In bottoms of Bassett's Creek near Suggsville station (Allen P. O.), Clarke County. (One small specimen seen, May 15, 1927, but there must be others in the vicinity.)

ACERACEAE. Maple Family.

Two or three genera and about 75 species, trees and shrubs, mostly in the north temperate zone. Many are cultivated for ornament or shade, and some yield timber or sugar.

ACER, L. The Maples.

Most of our maples fall into two groups, the hard or sugar maples, with flowers appearing with the leaves, and the soft or swamp maples, which bloom a month or two earlier, and have fruit nearly grown by the time the leaves unfold. Some of the first group are separated by rather obscure characters, and it is not quite certain how many of them occur in Alabama.

HARD MAPLES

Acer Saccharum, Marsh. (*A. saccharinum*, Wang.) (Northern) Sugar Maple.

A medium-sized tree, larger farther north, where it is the main source of maple sugar. It is commonly cultivated for shade in

*See Bull. Torrey Bot. Club 33:533. 1906.

some northern cities, and its wood is valuable for furniture, flooring, etc.

It is not certain that we have the typical *Acer Saccharum* in Alabama. It may be chiefly represented here by varieties *(barbatum, glaucum, or Rugelii),* and it is not very different from *Acer Floridanum,* which I may have sometimes mistaken for it. It is certainly not common here, anyway.

What I take to be this species grows in rich, especially calcareous, woods, in the northern half of the state. The following localities have been noted.

1A. South side of Mussel Shoals, Colbert County. (Locality doubtless now obliterated by the Wilson Dam.)
1B. Jackson County. Near Huntsville (Mohr). Weeden Mountain, Madison County. Limestone slopes, Morgan and Blount Counties. Franklin County.
2A. (or B?). Shaly bluffs near Simpson's Creek, Cullman County.
2B. Walker and Fayette Counties.
3. Blount, St. Clair, Jefferson and Bibb Counties.

Dr. Mohr reported the var. *barbatum* from Clay, Pike and Butler Counties (the last probably intended for Choctaw, for Mt. Sterling is in Choctaw), but the last two localities are well within the range of *A. Floridanum,* and may represent that species.

Acer Floridanum (Chapm.) Pax. (Florida) Sugar Maple.

Usually a smaller tree than the preceding, but not differing conspicuously. One or two varieties have been described. Blooms in March and April. Its economic properties have not been investigated, but are probably similar to those of *A. Saccharum.*

Grows in rich, especially calcareous, woods, mostly in the coastal plain. (The Coosa Valley records may represent *A. Saccharum.*)

3. St. Clair, Talladega, Jefferson and Shelby Counties. Bibb County (Mohr).
6A. Tuscaloosa, Bibb and Chilton Counties.
6C. Hale County.
7. Sumter, Dallas (Hatcher's Bluff) Autauga (vicinity of House Bluff) and Montgomery Counties.
10E. Pike, Dale, Coffee and Covington Counties.
10W. Sumter, Monroe and Butler Counties.
12. Geneva and Houston Counties.
13. Along Conecuh River southeast of Brewton.

Acer leucoderme, Small. (*A. Floridanum acuminatum,* Trel.)

A small tree, differing from our other sugar maples in having a leaning or crooked trunk, bark smooth or nearly so, and leaves

green but velvety beneath. Blooms in March and April. Too small and crooked to be useful.

Grows in rich woods and ravines and on bluffs, usually not calcareous.

1B. Warnock Mountain, Blount County (Mohr). South of Blount Springs.
2A. Near DeSoto Falls on Lookout Mountain. Marshall County (Harbison). Cullman County (Mohr, Wolf). On top of Warnock Mountain and along Calvert Prong of Warrior River, Blount County.
2B. Walker, Jefferson and Tuscaloosa Counties; frequent.
3. Limestone hill near Lagarde, Etowah County.
4. Coosa County.
5. Randolph, Chilton and Elmore Counties.
6A. Bibb County.
7. Near Hatcher's Bluff, Dallas County (Cocks).
10E. Dale and Covington Counties.
10W. Claiborne Bluff, Monroe County. "Mt. Sterling, Butler County." (Mohr). (Mt. Sterling is in Choctaw County, as stated on the preceding page, but in both cases Dr. Mohr or his editor may have intended this for the name of some place in Butler County.)
11. Choctaw, Washington and Clarke Counties.

SOFT MAPLES

Acer saccharinum, L. (*A. dasycarpum*, Ehrh.)
WHITE, SILVER, OR SOFT MAPLE.

A rather large and handsome tree. It is a favorite shade and park tree in northern cities, less so in the South, but it seems to be subject to disease, and therefore often looks shabby. About half a dozen varieties have been developed in cultivation. The wood is used some for furniture, boxes, broom handles, woodenware, etc.

Grows on muddy banks of rivers and creeks subject to considerable fluctuation.

1. On the Tennessee River and its larger tributaries, all the way across the state, but probably never common along Mussel Shoals, where the water could not fluctuate as much as in the sluggish reaches.
2B. Extends up the Warrior River to about ten miles above Tuscaloosa.
3. Common along the Coosa River and a few large creeks.
5. Along the Coosa River, but not common, on account of the many shoals, which limit the seasonal fluctuation of the water. Being gradually drowned out by the building of more high dams.
6A. Along the Warrior, Cahaba and Coosa Rivers.
6C. Common along the Tombigbee, Warrior, Alabama and Tallapoosa Rivers.
7. On the Tombigbee, Warrior and Alabama Rivers.
8 (and probably 10E). Along the Chattahoochee River.
10W, 11. Along the Tombigbee and Alabama Rivers.
14. Near Mt. Vernon (Mohr).

Acer rubrum, L. RED MAPLE, OR "REDBUD."

A medium-sized or sometimes a large tree, appropriately named, for its flowers, young fruits, and autumn leaves are all bright red. It blooms in February or March, and the fruits are just about grown by the time the leaves unfold.

This is one of the least appreciated of our common trees. It is planted for shade a good deal in the North, and less frequently in the South, and one horticultural variety has been described. The wood is said to be rather hard, close-grained, and easily worked, and good for cabinet-making, gun-stocks, etc., etc., but it is seldom sawn into lumber, because the trunk is usually irregularly shaped, or branches too low down, and also because trees large enough for saw timber are not very numerous in any one locality. It will probably be used more in the future, though, as more desirable species become scarcer. I have seen the wood used for charcoal in Chilton County, the bark is said to have been used for dye and ink, and the flowers attract many bees and must therefore yield some honey or beeswax early in the spring.

Grows on shady slopes and in wet woods and various kinds of swamps, and is most abundant on the poorer soils. I have seen it in every region in the state, but it is rare in 1 A, 9 and 12, and uncommon in 7.

A few varieties or closely related species have been described, such as *Acer Drummondii,* (or var. *tomentosum*) which seems to be merely a robust larger-leaved form growing in muddy swamps, and *A. Carolinianum* (or var. *tridens*), which seems to be the other extreme, growing in sour sandy soils.

The next species is sometimes put in a different genus (*Rulac,* or *Negundo*), on account of its compound leaves and certain other differences, but when that is done it makes complications in nomenclature, and it can very well be left in *Acer* without doing violence to the facts.

Acer Negundo, L. (*Negundo aceroides,* Moench). BOX ELDER.

A small to medium-sized tree, with leaning or crooked trunk, and green twigs. Blooms in March.

Often cultivated for ornament or shade, both North and South. Four horticultural varieties have been named. The wood

is said to be useful for ox-yokes, woodenware, interior finish, paper pulp, etc.

Grows in rich woods and on creek and river banks, especially in calcareous and non-ferruginous regions. Widely distributed, but nowhere abundant.

1B. Lauderdale, Madison (Mohr), Colbert, Lawrence (Mohr), Morgan and Blount Counties.
2B. Fayette, Walker, Jefferson and Tuscaloosa Counties.
3. Frequent throughout.
5. Cleburne and Elmore Counties.
6A. Tuscaloosa, Bibb and Elmore Counties.
6C. Montgomery County.
7. Frequent in most of the counties.
8. Marengo, Dallas, Wilcox and Barbour Counties.
10W. Sumter, Choctaw, Wilcox, Clarke, Monroe and Butler Counties.
11. Washington, Clarke and Monroe Counties.

AESCULACEAE (or HIPPOCASTANACEAE).

Horse-Chestnut Family.

About 2 genera and 20 species, trees and shrubs, mostly in the north temperate zone. Several are ornamental.

AESCULUS, L. The Buckeyes, Etc.

Trees or shrubs, with opposite palmately compound deciduous leaves, rather showy flowers of various shapes and colors in elongated clusters, and large brown seeds in roundish leathery pods.

Aesculus glabra, Willd. (Ohio) Buckeye.

A medium-sized tree with yellow flowers in May and prickly pods much like those of the horse-chestnut (which is a native of southeastern Europe, commonly cultivated in the northeastern states), ripe in September. Occasionally cultivated for ornament. The wood is light, soft, and difficult to split, and is said to be preferred to that of all other American trees for artificial limbs. The bark has medicinal properties, and the seeds contain some interesting drugs.

Grows in rich woods. Not common in Alabama.

1A. Ravines near Sheffield.
1B. Madison and Blount Counties (Mohr). Limestone slopes, Morgan County.
2A. Winston County (Mohr).
7. Along small creek a few miles south of Eutaw, Greene County.

Aesculus octandra, Marsh. (*A. flava,* Ait.) (Yellow) Buckeye

A medium-sized tree with smooth gray bark, yellow flowers in April, and smooth pods. Sometimes cultivated for ornament, like the preceding. The wood is soft, light, weak, and not very durable, but it is used more or less for boxes, crates, excelsior, and the unexposed parts of furniture, trunks, etc.

Grows in rich, especially calcareous, soils in the Tennessee Valley. Dr. Mohr found a fine grove of it on Monte Sano in Madison County, and I have seen it in Jackson and Marshall, and perhaps Morgan.

Aesculus Pavia, L. (Red) Buckeye.

A coarsely branched shrub, or rarely a small crooked tree with trunk a few inches in diameter, showy clusters of red flowers in March and April, and leaves and fruit much like those of *A. octandra.* The leaves develop with the flowers, earlier in spring than almost any other of our deciduous woody plants, except the elder, and they drop early in the fall.

Offered for sale by nurserymen, for ornamental purposes. The seeds and young shoots are poisonous to cattle, and have been used for killing fish in streams.

Grows in rich or dry woods, and in clearings, where fire is infrequent, nearly throughout the state. Probably more abundant in Alabama than anywhere else. (It is possible that I have confused one or two closely related species with it, for the alleged differences are based mostly on the flowers, and are therefore visible only a few weeks in the year.)

1B. Madison County (Mohr). Jackson and Marshall Counties.
2B. Marion, Walker, Jefferson and Tuscaloosa Counties; common.
3. Frequent throughout, or at least as far up as Etowah County.
5. Occasional throughout.
6A. Tuscaloosa, Chilton and Elmore Counties.
6B. Bibb County.
6C. Hale and Autauga Counties.
7. Sumter, Greene, Marengo, Dallas (Cocks) and Montgomery Counties.
8, 9. Sumter and Marengo Counties.
10E. Pike and Coffee Counties.
10W. Sumter, Choctaw and Butler Counties.
11. Choctaw and Washington Counties.
12. Geneva County.
13. Mobile and Baldwin Counties.

Aesculus parviflora, Ait. (*A. macrostachya,* Willd.)
(White) Buckeye

(Fig. 62)

A shrub of more graceful habit than the preceding, usually growing in colonies with about one stem to the square foot. It has small white flowers in long erect spikes, and blooms from late May in the southern part of the state to late July in the northern; but only about one flower in 100 sets fruit.

This is a very ornamental shrub, especially when in bloom, and I have seen it in cultivation as far north as Long Island, New York, but it seems to be rather difficult to transplant successfully from its native haunts. The leaves are sometimes eaten by cattle.

Grows in rich woods, especially in calcareous and potassic soils, well protected from fire. There is probably more of it in Alabama than in all the rest of the world.

1B. Near Blount Springs and on Warnock Mountain.

2A. Blount and St. Clair Counties.

2B. Walker, Jefferson and Tuscaloosa Counties, mostly near the Warrior River.

3. Etowah, St. Clair, Blount, Jefferson and Talladega Counties.

5. Clay and Chilton Counties.

6B. Small dry valley near Joffre (formerly Kingston), Autauga County.

6C. Ravines southeast of Booth and near House Bluff, Autauga County. Discovered near the Chattahoochee River, probably near Fort Mitchell, by Bartram in July, 1776(?).

7. Near Epes, Sumter County. About 16 miles southeast of Montgomery (Miss Z. Rogers, May, 1927).

8. Dallas County.

10E. "Henry and Franklin Counties" (Mohr). (Probably meaning near the old town of Franklin, Henry County).

10W. Butler, Wilcox, Monroe and Clarke Counties.

11. Near Suggsville, Clarke County.

Two or three other species of *Aesculus*, such as *A. discolor* Pursh, *A. austrina* Small, and *A. Georgiana* Sarg., have been credited to Alabama, but I have never identified them, and they probably do not differ much from some of those above listed.

FIG. 62. *Aesculus parviflora* on shale bluffs of Warrior River near Tidewater (Lock 13), Tuscaloosa County. June 28, 1911.

RHAMNACEAE. BUCKTHORN FAMILY

About 50 genera and 600 species, mostly trees and shrubs, widely distributed. Several are ornamental or medicinal, and a few have edible fruits.

RHAMNUS, L. (The Buckthorns).

Rhamnus Caroliniana, Walt. (Indian Cherry).

A deciduous single-stemmed shrub or slender tree, with inconspicuous whitish flowers in May and small reddish berries in fall. Sometimes cultivated for ornament.

Grows in moderately rich woods, especially in calcareous soils, protected from fire.

1B. Limestone, Madison, Jackson, Franklin, Morgan and Blount Counties, mostly on or near limestone outcrops.
2B. On shaly bluffs near Simpson's Creek, Cullman County, and along and near Warrior River, Tuscaloosa County.
3. On limestone, Etowah, Talladega and Bibb Counties.
5. Shinbone Valley, Clay County (Mohr).
6A. Tuscaloosa County.
6C. Perry County.
7. Sumter, Greene, Hale, Perry and Autauga Counties. Dallas County (Cocks).
10W. Butler, Wilcox and Monroe Counties.
11. Clarke and Conecuh Counties.
15. Shell mounds, Baldwin County (Mohr).

Rhamnus lanceolata, Walt.

A shrub, smaller than the preceding. Grows in dry calcareous soils.

7. A few miles south of Newbern, Hale County. Near Epes, Sumter County. (E. A. Smith).
10W. On limestone west of Allenton, Wilcox County (perhaps the same place where it was found by Buckley about the middle of the last century). Butler County (Mohr).

SAGERETIA, Brongniart.

Sageretia minutiflora (Mx.) Trel. (Apparently no common name)

A straggling or climbing shrub, several feet tall, with very slender stems. Economic properties unknown.

15. Shores of Mobile Bay (Mohr).

BERCHEMIA, DeCandolle.

Berchemia scandens (Hill) Trel. *(B. volubilis*, DC.)
Rattan Vine

A stout woody vine, climbing trees by twining like a left-handed screw, with smooth dark green bark, smooth deciduous leaves, small greenish yellow flowers, and small elongated blackish berries. Little is known of its economic properties, but it has

more solid wood than most other vines, and Prof. Stelle reported the stems to have been used for binding bundles of shingles.

Grows mostly in river-bottoms and in calcareous soils in the coastal plain, but found occasionally in the hill country. Seems to require protection from fire, like nearly all other woody vines.

1B. Mostly on limestone or in bottoms, but sometimes on roadsides; Jackson, Madison, Morgan and Franklin Counties.
3. Jefferson, Shelby, Tuscaloosa and Bibb Counties.
5. Elmore and Tallapoosa Counties.
6A. Tuscaloosa, Bibb, Perry and Elmore Counties.
6C. Greene, Perry, Dallas, Autauga and Montgomery Counties.
7. Sumter, Perry, Marengo, Dallas and Montgomery Counties.
8. Sumter, Wilcox, Lowndes and Pike Counties.
9. Sumter County.
10E. Crenshaw, Pike and Barbour Counties.
10W. Choctaw, Clarke, Wilcox, Monroe and Butler Counties.
11. Choctaw, Washington, Clarke, Monroe and Conecuh Counties.
12. Around a cave in southeastern corner of Covington County.

ZIZYPHUS, Gaertner.

Zizyphus vulgaris, Lam. JUJUBE

A medium-sized tree, native of the Mediterranean region; occasionally cultivated for its fruit, which is edible and medicinal.

Escaped from cultivation around Mobile, according to Mohr.

CEANOTHUS, Linnaeus.

Ceanothus Americanus, L.

RED-SHANK. RED-ROOT. (NEW JERSEY TEA).

A low bushy shrub with conspicuously veined deciduous leaves, and small dense clusters of small white flowers in May and June. A few varieties or related species, differing chiefly in the size of the leaves, have been described, but there seem to be all gradations between them. The largest-leaved forms are generally found on the better soils, and vice versa.

Occasionally cultivated for ornament, especially in Europe, where many varieties and hybrids have been derived from it. The roots, bark and leaves have some medicinal properties. The leaves, although they contain no caffeine, were used as a substitute for tea in the northern states during the Revolution, and to some extent in the South during the Civil war. A cinnamon dye can be extracted from the plant, according to Porcher.

Grows in dry open woods, especially in sandy long-leaf pine forests. On account of its small size, it does not take it long to renew its growth after a fire. Widely distributed over the state.

1A. Lauderdale County (Mohr). Limestone and Colbert Counties.
1C. Smithers Mountain, Madison County, and Little Mountain, Morgan and Lawrence Counties.
2A. Madison, Marshall, Cullman, DeKalb and Cherokee Counties.
2B. St. Clair, Walker and Tuscaloosa Counties.
3. DeKalb, St. Clair, Jefferson, Shelby and Talladega Counties.
4. Common on sunny slopes.
5. Frequent throughout.
6A. Tuscaloosa, Hale, Bibb and Chilton Counties.
6B. Tuscaloosa, Autauga and Elmore Counties.
6C, 7. Greene County.
9. Sumter County.
10E. Crenshaw, Pike, Coffee, Dale and Henry Counties.
10W. On the Buhrstone Mountains, etc.; Choctaw, Monroe and Butler Counties.
11. Monroe County.
12. Covington County.
13. Clarke, Baldwin, Escambia, Covington, and Geneva Counties. Mobile County (Mohr).

Ceanothus microphyllus, Mx. (Apparently no common name)

A small diffusely branched shrub, similar to the preceding, except that the stems are yellowish, and the leaves only about a quarter of an inch long, and evergreen. Economic properties unknown.

Grows in dry sandy long-leaf pine forests, subject to frequent fires, in the southern edge of the eastern half of the state. (Commoner in Florida.)

12. Covington, Geneva and Houston Counties.
13. Covington and Geneva Counties.

VITACEAE. Grape Family.

About 12 genera and 500 species, mostly vines, in tropical and temperate regions. Several have edible fruits of great economic importance, and some are cultivated for ornament.

VITIS, Linnaeus. The Grapes, Muscadines, etc.

Deciduous woody vine, climbing by tendrils, with inconspicuous greenish flowers in early summer, and more or less edible berries in fall. The species are somewhat variable and puzzling, and any one who likes to make fine distinctions might find a few more in the state than are recognized here. The muscadine is sometimes put in a different genus (*Muscadinia*).

Vitis aestivalis, Mx. (Common) Wild grape.

Sometimes cultivated for ornament. The fruit is edible, but more palatable when made into jelly than eaten raw. Some varieties of cultivated grapes are said to have been derived from this.

Grows in various places protected from fire, such as rock outcrops, rich woods, bottoms, and roadsides. Pretty widely distributed.

1B. Jackson, Madison, Marshall and Franklin Counties.
1C. Lawrence County.
2A. On mountain slopes, DeKalb and St. Clair Counties.
2B. Tuscaloosa County.
3. Talladega County.
4. Calhoun, Talladega and Clay Counties.
5. (Doubtless occurs, but I never happened to make note of it.)
6A. Franklin County, and doubtless others.
6C. Greene County. House Bluff, Autauga County.
7. Sumter, Hale and Dallas Counties.
8. Wilcox County.
10E. Crenshaw, Coffee and Henry Counties.
10W. Wilcox County.
14. Upper part of the delta.

Vitis cinerea, Engelm.

Differs from the common wild grape in having smaller leaves which are more hairy on both sides, giving them an ashy look.

Dr. Mohr reported it from Hale and Mobile Counties, and I have seen it on the upper Wetumpka Road in the outskirts of Montgomery. Its range is mostly west of the Mississippi River, and it may not be native in Alabama.

Vitis bicolor, LeConte.

Known in Alabama at present only from rocky places along the Blue Ridge (region 4). Dr. Mohr reported it from Calhoun, Talladega and Clay Counties, and I have seen what is probably the same thing on Alpine Mountain, in Talladega County.

Vitis cordifolia, Mx. (Frost Grape.)

This has smoothish toothed leaves suggesting those of the muscadine, and bunches of fruit like those of the common wild grape, except that the berries are black and not very good to eat. Blooms in May. Occasionally cultivated for ornament.

Grows mostly in dry woods and thickets; not common.

1B. Near Triana, Madison County, on limestone knob near Cedar Plains, Morgan County, and on slopes of Warnock Mountain, Blount County.

3. Limestone slopes near Valley Head, DeKalb County, and limestone hill near Lagarde, Etowah County.

5. Clay County (Mohr). Lee County (Baker & Earle).

Vitis vulpina, L. *(V. riparia,* Mx.) (River Grape.)

According to Dr. Mohr this is especially resistant to the insect pest *Phylloxera,* and is therefore largely used in Europe as a stock for grafting the wine grapes on.

Grows mostly on river banks.

7. Along the Warrior and Tombigbee Rivers, in Greene, Marengo and Sumter Counties.

9. Sumter County.

10W. Sumter and Choctaw Counties. Lisbon, Clarke County (Mohr).

11. Choctaw County.

Vitis rotundifolia, Mx. *(V. vulpina,* T. & G.)
Muscadine, (or Bullace.)

A well-known species, with large thick-skinned dark purple berries, ripe in late summer, which are eaten by boys on foraging expeditions, and also peddled in the towns and occasionally sold in stores. The Scuppernong is a horticultural variety, commonly cultivated in the South, with larger, paler and sweeter berries. The flowers furnish honey.

Grows in various places protected from fire, such as dry woods, thickets, hammocks, swamps, dunes, and roadsides. Widely distributed over the state, but commonest in the coastal plain.

1A. Bluffs on south side of Mussel Shoals, Colbert County.

2A. Cullman, Blount and Etowah Counties.

2B. Jefferson and Tuscaloosa Counties.

3. St. Clair County.

4. Near Ironaton Gap and Hollins.

5. Chambers County (and doubtless in all the others).

6A. Tuscaloosa and Elmore Counties.

6B. Tuscaloosa and Autauga Counties.

6C. Greene, Autauga, Macon, and doubtless all the other counties.

7. Dallas and Montgomery Counties.

8. Wilcox County.

10E. Frequent throughout.

10W. Butler, Conecuh, Monroe and Choctaw Counties.

11. Choctaw, Clarke and Monroe Counties.

12. Geneva County.

13. Washington and Mobile Counties.

15. Baldwin County.

Vitis Baileyana, Munson, is credited to Alabama by Small, but without definite locality. Three other species of *Vitis* which are reported from states east and west of us should be looked for in Alabama.

CISSUS, Linnaeus.

Cissus incisa (Nutt.) Desmoul. *(Vitis incisa,* Nutt.)

A slender vine with fleshy evergreen trifoliate leaves. Occasionally cultivated for ornament.

Found by Dr. Mohr trailing over bushes in sand in the coast strip, in Mobile and Baldwin Counties.

AMPELOPSIS, Michaux.

Deciduous vines, with small black or bluish uneatable berries. Apparently no common names in general use.

Ampelopsis cordata, Mx. *(Vitis indivisa,* Willd.)

A vine with leaves much like those of the muscadine, and small berries in flattish clusters. Sometimes cultivated for ornament.

Grows mostly on alluvial banks and in limestone regions, but sometimes a weed along roadsides.

1B. Near Russellville (Mohr).
2B. Along Warrior River, Tuscaloosa County.
3. St. Clair and Jefferson Counties.
6A. Tuscaloosa County.
6C. Hale County. House Bluff, Autauga County.
7. Dallas (Mohr) and Marengo Counties.
8. Barton's Bluff on Tombigbee River, Marengo County.
9. Sumter and Marengo Counties.
10W. Wilcox County. Near Claiborne (Mohr).
14 (?). Mobile and Baldwin Counties (Mohr).

Ampelopsis arborea (L.) Rusby. *(Cissus stans,* Pers.; *Vitis bipinnata,* T. & G.)

A vine with minutely warty bark, compound bluish-green leaves, and shiny black berries. Occasionally cultivated for ornament, to shade porches, etc.

Native along rivers, in low hammocks, calcareous thickets, etc., and sometimes a weed along roads and railroads, especially in and near swamps. Mostly in the coastal plain.

1A. South side of Mussel Shoals, Colbert County. (Probably now drowned out by the Wilson Dam.)
1B. Madison, Limestone, Morgan and Lawrence Counties (mostly a weed).
2B. Along Warrior River, Jefferson County.

3. Cherokee and Talladega Counties.
6A. (?). Tuscaloosa County (E. A. Smith).
6C. Greene, Hale and Autauga Counties.
7. Marengo, Dallas, Lowndes, Montgomery and Macon Counties.
8. Sumter(?), Marengo, Dallas and Wilcox Counties.
9. Sumter County.
10E. Crenshaw County.
10W. Marengo, Wilcox, Butler and Choctaw Counties.
11. Washington, Clarke and Conecuh Counties.
12. Geneva County.
13. Washington County.
13 or 14. Mobile County (Mohr).
14, 15. Baldwin County.

PARTHENOCISSUS, Planchon. *(Psedera,* Neck.; *Quinaria,* Raf.)

Parthenocissus quinquefolia (L.) Planch. *(Ampelopsis quinquefolia,* Mx.) VIRGINIA CREEPER.

A rather handsome vine, sometimes trailing on the ground, but oftener clinging to rocks or trees by its peculiar disk-tipped tendrils. The stems are sometimes as much as two inches in diameter, and are very porous. The plant is sometimes mistaken for poison ivy, but is easily distinguished from that by the fact that its leaves normally have five leaflets, which taper gradually to the base. Flowers in June; berries ripe in fall, in flattish clusters, small, bluish, not edible.

This is often cultivated for ornament, and will cover the side of a brick or stone building in much the same manner as the English ivy. It is showy for awhile in fall, when the leaves turn red. The bark and young shoots have some medicinal properties.

Widely distributed over the state, in rich or damp woods, protected from fire; sometimes showing weedy tendencies. Not yet observed in regions 14 or 15, but it may grow in those nevertheless.

TILIACEAE. Linden Family.

About 40 genera and 375 species, mostly trees, and mostly in the tropics of the southern hemisphere. Some are cultivated for ornament or shade, and some yield lumber, fiber, honey, etc.

TILIA, Linnaeus. Lin, Linden, Basswood.

Medium-sized to large trees, with obliquely heart-shaped toothed deciduous leaves, fragrant white flowers in early summer, and soft easily worked wood. This genus is widely distributed in Europe, Asia and North America, but the number of species is at present very uncertain. Several alleged distinct North American species and varieties have been described in the last 25 years, but they all have about the same wood, bark, flowers, fruit and habitat, and the distinctions are based mostly on slight differences in the size and pubescence of the leaves and the pubescence of the summer shoots, so that there is practically no way of identifying the species in winter (as can be done with most of our other trees). The cuts used to illustrate the genus in recent manuals are much more alike than those of *Crataegus,* so much so indeed that they could easily be taken for all one species.

Several species are cultivated for shade trees. The wood is much like that of yellow poplar, and is used in other states for boxes and crates, mill-work, woodenware and novelties, furniture and fixtures, picture frames and molding, excelsior, piano keys, baskets, bread-boards, ironing boards, and many other purposes. The bark is pretty tough, and according to Wailes so much of it was being used for ropes in Mississippi about the middle of last century as to threaten the extermination of the trees. The flowers are an important source of honey.

References: Brush 3, Bush, Sargent 2.

Dr. Mohr reported two species of *Tilia* from Alabama, but the latest monographic treatments credit us with eight or ten. For all practical purposes however, they may as well be treated as one for the present, as they are not separated in my field notes.

Our lindens grow in rich woods, especially on limestone and near rivers, where they are pretty well protected from fire. They are nowhere abundant, and it is unusual to find more than one tree to the acre. Unlike some genera which have given employ-

ment to species-splitters (e.g., *Crataegus*), and several species sensitive to fire (e.g., *Sassafras, Prunus serotina*), they have shown hardly any weedy tendencies as yet. (If they ever do the taxonomic difficulties will be increased.)

My records of their distribution in Alabama are as follows:

1A. Bluffs on south side of Mussel Shoals, Colbert County.
1B. Jackson, Madison, Morgan and Franklin Counties. Blount County (Mohr).
2A. Cullman County (Mohr). Chandler Mountain, St. Clair County. West slope of Lookout Mountain near Valley Head.
2B. Fayette, Jefferson and Tuscaloosa Counties.
3. Etowah, Blount and Talladega Counties.
4. Mountains north of Pyriton, Clay County.
5. Cleburne, Clay, Chilton and Elmore Counties.
6A. Tuscaloosa, Bibb and Elmore Counties.
6C. Hale and Autauga Counties.
7. Greene, Sumter, Marengo, Dallas, Autauga and Montgomery Counties.
8. Montgomery, Bullock and Russell Counties.
10E. Pike, Coffee, Dale and Geneva Counties.
10W. Frequent throughout.
11. Choctaw, Washington and Clarke Counties.

For the benefit of persons who may hereafter be able to distinguish the different forms of *Tilia* better than the present writer can, the following fragmentary notes on the local distribution of some of the supposed species and varieties is given. They are based mostly on Sargent's Manual and Sudworth's Check List, supplemented by oral information given by Mr. W. W. Ashe during a visit to Tuscaloosa in August, 1926, and the paper by B. F. Bush, cited in the bibliography.

Tilia leucocarpa, Ashe *(T. nuda,* Sarg.). Mostly in the central portions. Dallas County (Cocks). Near Greensboro and Demopolis (Bush).

T. leucocarpa glaucescens (Sarg.) Bush. Bibb and Dallas Counties.

T. australis, Small. Mostly in the Sand Mountain section. Also in Coosa County (Ashe).

T. Floridana, Small. Jackson (an old specimen cited by Bush).

T. Floridana Alabamensis, Ashe *(T. F. oblongifolia,* Sarg.). Birmingham and northeastward (Ashe). Dallas County (Cocks). Near Boligee and Greensboro (Bush).

T. neglecta, Spach. Lauderdale County (Ashe).

T. lata, Ashe. Lawrence and Winston Counties, especially the latter. (Not reported from any other state.)

T. heterophylla, Vent. Common in Coosa County (Ashe). Dallas County (Cocks).

T. heterophylla Michauxii (Nutt.) Sarg. Lawrence, Winston and Coosa Counties (Ashe). Dallas County (Cocks).

T. heterophylla amphiloba, Sarg. *(T. apposita,* Ashe?). Near Valley Head, DeKalb County.

STERCULIACEAE.

About 50 genera and 750 species, mostly tropical. Some are cultivated for ornament, and others are the source of chocolate and other beverages.

FIRMIANA, Marsigli.

Firmiana platanifolia (L.f.) R. Br. *(Sterculia platanifolia,* L.f.) Japanese or Chinese Varnish Tree.

A medium-sized tree with smooth green bark, large palmately lobed deciduous leaves, large clusters of small yellowish flowers, and dry pods which have the peculiarity of opening long before the seeds are ripe.

Commonly cultivated for ornament or shade in cities (especially Montgomery), and occasionally escaping to vacant lots around Mobile, according to Mohr.

THEACEAE (or TERNSTROEMIACEAE).

Camellia or Tea Family.

About 18 genera and 175 species, trees and shrubs, in the warmer parts of the world. One species (with varieties) is the source of tea, and several are ornamental.

GORDONIA, Ellis.

Gordonia Lasianthus, L. (Loblolly, Red, or Tan Bay.)

A stately evergreen tree when fully developed, with showy white flowers (about the size of those of the white bay, *Magnolia glauca),* in mid or late summer.

Sometimes planted for ornament, and it would doubtless be used more for this purpose if it was better known. According to Sargent the wood has been used for cabinet-making. In the 18th

century Bartram found residents of Florida using its bark for tanning.

This is rather rare in Alabama, and does not grow as large here as it does farther east. It seems to be confined to the southwestern pine hills (region 13). Prof. Stelle wrote of it in 1888 as if it was common enough in Mobile County to be used for fuel, but Dr. Mohr knew it only as a small tree six or eight inches in diameter and 15 or 20 feet tall, in a swamp near Whistler. I have seen still smaller specimens in the western part of Mobile County, and near Geneva.

STEWARTIA, Linnaeus (also spelled *Stuartia*). (Apparently no common name)

Tall deciduous shrubs, with large white flowers in late spring, but no other striking characteristics, so that they attract little attention when not in bloom, and are scarcely known except to botanists. They are not at all common, which is another reason why they do not seem to have any common name.

Stewartia Malacodendron, L. *(S. Virginica,* Cav.)

This blooms in May, and has flowers about 2½ inches in diameter, suggesting the flower clusters of the dogwood at a little distance. It ought to be cultivated for ornament, if nothing else, but I have found no record of its being so used. It is so rare and showy that wherever it grows near a road it is liable to be destroyed by vandals when in bloom. When not in bloom it is a very ordinary-looking shrub, not easily identified.

Grows in dry or rich woods; rather rare.

2A. Cullman County (Mohr, Harbison, Wolf). Along Eight-mile Creek near St. Bernard.

2B. Along Hurricane Creek, Tuscaloosa County (Jelks Barksdale and others, May, 1928).

4. Clay County.? (Seen only in summer, and identification a little doubtful.)

6A. Found by Dr. Eugene A. Smith a few miles east of Tuscaloosa about fifty years ago, but he was never able to locate it again. Seen from train in southeastern portion of Bibb County, May 5 and 6, 1927.

6B or C. Near Bridge Creek about 2½ miles east of Booth, May 18, 1924. (See Torreya 24:32. 1924.)

10W. Creek bottoms near Greenville, June, 1906 (past blooming).

13 or 15. Mobile County (Mohr, 1879).

Stewartia pentagyna, L'Her.

Ornamental, like the preceding, and offered for sale in some nursery catalogues.

Grows on bluffs in the plateau region (2 A). Found in Cullman County by Mohr and Harbison, in Jackson County by Harbison, and in Marshall County by the writer (in 1906 only).

HYPERICACEAE. St. John's-Wort Family.

About 8 genera and 250 species, mostly shrubs and herbs.

ASCYRUM, Linnaeus. (St. Andrew's Cross. St. Peter's Wort.)

Small shrubs, with numerous small entire opposite leaves, and yellow flowers with four narrow petals arranged like a letter X, or St. Andrew's cross. Economic properties unknown.

Ascyrum stans, Mx.

Evergreen. Blooms all summer. Grows in sandy bogs, etc., mostly in the coastal plain, and where less than 1% of the area was cultivated in cotton in 1880.

2A. Cullman County (Mohr). DeKalb, Marshall and St. Clair Counties.
4. Wet ravines in the mountains near Pyriton, Clay County.
6B. Chilton and Autauga Counties.
13. Washington, Clarke, Monroe and Baldwin Counties. Mobile and Escambia Counties (Mohr).

Ascyrum hypericoides, L. (*A. Crux-Andreae,* L.?, *A. multicaule,* Mx?)

Under this name may be included two or three species, but if so they are hard to distinguish.

Grows in dry woods, in rather poor soil; not abundant.

1A. Lauderdale County (Mohr).
1B. Falkville, Morgan County (Mohr).
1C. Morgan County.
2A. Cullman and Marshall Counties.
2B(?). Tuscaloosa County (E. A. Smith).
4. Clay County (Mohr).
5. Rocky hills near Coosa River, Chilton County (a narrow-leaved extreme).
6B. Bibb County.
12. Chalk Hill, near Healing Springs, Washington County.
13. Washington, Clarke, Mobile, Baldwin and Escambia Counties (Mohr).

HYPERICUM, Linnaeus. (St. John's-Worts).

About half our species are shrubs, evergreen or nearly so, and the rest herbs. All have simple opposite leaves, and yellow flowers, in summer. Some of them are quite showy, but they seem to be little known to persons other than botanists, at least in the South, and perhaps have no bona-fide common name in this country, the name given above having originated in Europe, where there are several species of the same genus.

Hypericum prolificum, L.

Reported from rocky banks in Lauderdale County, presumably in region 1 A, by Prof. M. C. Wilson.

Hypericum aureum, Bartram.

Evergreen or nearly so, two to six feet tall. Blooms mostly in June. An ornamental shrub, sometimes cultivated in the North.

Grows mostly on bluffs of limestone and shale; rather abundant in some places. (Probably commoner in Alabama than anywhere else.)

1A. Bluffs on both sides of the Tennessee River, near Florence and Sheffield.
1B. On limestone slopes, Jackson, Madison, Morgan, Lawrence and Franklin Counties.
2A. Pisgah gorge, Jackson County (Harbison).
2B. Bluffs along Warrior River a few miles above Tuscaloosa.
3. On limestone, Etowah and Bibb Counties.
5. Clay County (Mohr). Rocky bluffs along Coosa River in Chilton County and Tallapoosa River in Elmore.
7. Chalk bluffs along Tombigbee River near Epes and Demopolis.
8. (Grows on the Georgia side of the Chattahoochee River near Eufaula, and presumably on the Alabama side also.)

Hypericum myrtifolium, Lam.

A small evergreen with rounded leaves covered with a fine waxy powder which gives them a soapy feel. Flowers rather large and showy.

Grows in shallow pine-barren ponds. (Commoner in Georgia.)

13. Near Bay Minette and Oak, Baldwin County.
15. Dauphin Island, Mobile County (Mohr).

The next three or four species form a sort of linear series, differing mainly in size of leaves, which might be correlated merely with soil fertility; but their ranges and habitats are different, and it is not certain that they intergrade, so that it is expedient to treat them separately.

Hypericum fasciculatum, Lam.

A shrub of rather striking appearance, two to five feet tall, much branched above the middle, with spongy reddish bark toward the base, numerous needle-like evergreen leaves, and a profusion of yellow flowers all summer.

Grows in or around pine-barren ponds and swamps, often associated with the pond cypress, and having a somewhat similar distribution.

10E. Extreme southern portions of Coffee and Henry Counties.
12. Washington, Covington, Geneva and Houston Counties; common.
13. Common nearly throughout.

A small sprig of a plant which could not be distinguished from this was sent in by Dr. S. J. Lloyd from dry rocky hills near Walnut Creek in Chilton County (region 5) in the summer of 1921. On Aug. 16, 1927, Dr. Lloyd and the writer searched for it again, but without success.

Hypericum galioides, Lam.

An evergreen shrub, several feet tall.

The identity of this species is somewhat in doubt, but specimens which seem to belong to it grow in springy places and river shoals in the central part of the state.

2B. Formerly on Squaw Shoals in the Warrior River, at the western corner of Jefferson County, but drowned out by a 63-foot dam in 1915. (It may have also been on some of the other shoals between there and Tuscaloosa, but those were obliterated in the same manner still earlier.)*
3. Abundant in a springy swamp at Tannehill, Tuscaloosa County, some of the specimens ten feet tall. Also on shoals in Cahaba River a few miles above Centerville.

Hypericum galioides, var. **pallidum**, Mohr.

Differs from the preceding in having the leaves a little larger and paler. Grows on river and creek banks in the lower part of the coastal plain.

10W. or 11 (?). Clarke County (Mohr).
12. Along Double Bridges Creek and Pea River near Geneva.
13. Near Calvert and Flomaton.
13 or 14. Stockton, Baldwin County (Mohr).

Hypericum aspalathoides, Willd.

A shrub about a foot high, with numerous short stiff narrow evergreen leaves something like those of a dwarf spruce tree.

Grows in the poorest sand, either dry or damp.

13. Monroe County. Baldwin and Mobile Counties (Mohr).
15. Baldwin County.

*See Torreya 14:151. 1914.

Hypericum nudiflorum, Mx. (*H. cistifolium*, Lam.?)

A slender sparingly branched shrub, with leaves about the size of those of *H. aureum*. Grows mostly on edges of sandy swamps; rather rare.

13. Swamp of Three-mile Creek, Mobile County (Mohr).

Hypericum opacum, T. & G.

Another small weak comparatively unbranched shrub, smaller in every way than *H. nudiflorum*, and differing from *H. sphaerocarpum* in having fewer and larger leaves. Blooms in summer.

Grows in sandy bogs and low pine lands, in the southwestern pine hills (region 13). Dr. Mohr reported it from Mobile and Baldwin Counties, and I have seen it in Escambia and Covington.

Hypericum sphaerocarpum, Mx.

A small erect shrub with a single stem, woody at the base, herbaceous and branched above. Blooms in May and June.

Grows on limestone outcrops.

1B. Madison and Franklin Counties (Mohr). (These records may pertain to the next species, which was described after Dr. Mohr's death.)

7. Between Eutaw and Boligee, Greene County. Bald prairies near Gallion, Hale County (Mohr).

11. Limestone glade near Suggsville, Clarke County.

Hypericum turgidum, Small. (Fl. S. E. U. S., 788. 1903)

Similar to the preceding, and perhaps not specifically distinct.

Grows on flattish outcrops of limestone, in the Tennessee Valley (region 1 B). Collected by Ferdinand Rugel in 1843, somewhere between Huntsville and "Summerville" (doubtless meaning Somerville), and later by W. M. Canby near Huntsville. Found by the writer in September, 1927, at two places in Morgan County, several miles apart (both perhaps near Rugel's route), and in May, 1928, near the base of Warnock Mountain in Blount County.

THYMELEACEAE. Mezereum Family.

About 40 genera and 425 species, mostly shrubs with tough bark, widely distributed. A few are cultivated for ornament.

DIRCA, Linnaeus.

Dirca palustris, L. Leatherwood. (Also called Moose-wood and Wicopy in the North.)

A deciduous shrub a few feet tall, with very tough bark, smooth entire leaves, and small yellow flowers in early spring. Sometimes cultivated for ornament. The bark has some medicinal properties.

Grows in rich woods, especially in virgin forests and near streams, where it is well protected from fire. It has a rather peculiar distribution, if it is all one species (and no variations seem to have ever been suggested). It ranges northward to Canada, and in New England is found mostly in cool, damp woods, but in Georgia and Alabama it seems to be chiefly confined to the coastal plain. Its known distribution in Alabama is as follows:

2A. Along West Fork of Sipsey Fork of Warrior River, near northern edge of Winston County.

2B. Damp shady ravine near Lock 14, Tuscaloosa County.

10W. Rich woods west of Snow Hill, and along Pine Barren Creek south of Ackerville, Wilcox County. Near Limestone Creek, a few miles northeast of Claiborne, Monroe County. Between Dickenson and Grove Hill, Clarke County.

11. Near Gilbertown, Souwilpa and Silas, Choctaw County. Bottoms of Bassett's Creek near Suggsville sta. (Allen P. O.), Clarke County.

LYTHRACEAE. Loosestrife Family.

About 20 genera and 400 species, mostly in tropical America. A few are ornamental, and one furnishes henna dye.

DECODON, J.F. Gmelin. (Apparently no genuine common name)

Decodon verticillatus (L.) Ell. (The only North American species.)

A weak short-lived deciduous shrub, with spongy bark near the base, and long branches that bend over and take root near their tips.

Grows in boggy or peaty swamps or shallow water. Rather rare in Alabama, but commoner farther east.

1B. In Limestone Creek and in a slough in the Tennessee River bottoms, Limestone County.

6A. Tuscaloosa and Bibb Counties (Mohr).

13. Near Andalusia (and just south of the state line near Florala).

15. Near Orange Beach, Baldwin County.

Lagerstroemia Indica, L., the crepe myrtle, a small tree commonly cultivated for ornament in both city and country, sometimes persists for years after the house near which it was planted disappears, and may spread a little by suckers, but it is doubtful if it propagates itself spontaneously by seed. Dr. Mohr reported it as established in Mobile County.

ARALIACEAE. Ginseng Family.

About 50 genera and 500 species, mostly shrubs and herbs, widely distributed. Mostly aromatic; some medicinal and some ornamental.

ARALIA, Linnaeus. (Spikenard, Angelica, Sarsaparilla, etc.)

Mostly herbs. The following is the only shrubby one in the United States:

Aralia spinosa, L. Prickly Ash. (So called in the southern states, but it is not the prickly ash of northern books.)

A woody plant of tropical aspect, with a prickly, usually simple erect stem, sometimes as much as six inches in diameter and thirty feet tall, but usually not over one inch by six feet. Leaves compound, over a foot long and wide. (A leaf brought to the University from a young sprout in the near-by woods on May 6, 1921, was 6 feet 9½ inches long, with the lowest side branches about 3 feet long, and had 250 leaflets.) Flowers small, numerous, in large compound clusters, in midsummer. Fruit a small blackish berry.

Sometimes cultivated for ornament. The bark is aromatic and often used in domestic medicine, probably in much the same way as the northern prickly ash (*Xanthoxylum;* see page 225), but it has not yet obtained recognition in the pharmacopoeias, or even in the U. S. Dispensatory.

Grows in rich woods, hammocks, bluffs, bottoms, etc., where it is pretty well protected from fire; in nearly all parts of the state south of the Tennessee Valley.

2A. Madison, Marshall and DeKalb Counties. Cullman County (Mohr).

2B. Walker and Tuscaloosa Counties.

3. Blount, St. Clair and Calhoun Counties.
4. Clay and Coosa Counties.
5. Chilton, Elmore and Chambers Counties.
6A. Lamar, Pickens, Tuscaloosa, Bibb, Chilton and Elmore Counties.
6B. Autauga County.
6C. Autauga and Montgomery Counties.
7. Dallas County.
8. Dallas, Montgomery, Crenshaw and Pike Counties.
10E. Crenshaw, Pike, Dale, Coffee and Covington Counties.
10W. Common practically throughout.
11. Choctaw, Washington, Clarke and Conecuh Counties.
12. Covington and Geneva Counties.
13. Mobile, Baldwin (near Hurricane) and Covington Counties.
13 or 15. Hammocks on west side of Mobile Bay, a few miles below Mobile, and bluff between Montrose and Volanta, Baldwin County.

CORNACEAE. Cornel or Dogwood Family.

About a dozen genera and 90 species, mostly trees and shrubs, and mostly in the north temperate zone. Some are useful for their wood, and several are cultivated for ornament.

CORNUS, L. The Dogwoods, etc.

Deciduous shrubs or small trees, with small clustered white flowers, followed by red, blue or white berries. The arborescent species, with flower-heads surrounded by large white petal-like bracts (including the first one listed below, one near the Pacific coast, and one in Japan), are sometimes put into a separate genus, *Cynoxylon* (from the Greek words for dog and wood).

Cornus florida, L. (Common, or Flowering) Dogwood.

(Fig. 63)

A well-known small tree, with trunk usually leaning or crooked, and not more than a foot in diameter and 25 feet tall. The flowers appear with or a little before the leaves in March and April (in February in central Florida), and the red berries remain on the tree most of the winter.

Often cultivated for ornament, with two horticultural varieties, one with drooping branches and one with pink bracts. The bark, especially of the root, is bitter and tonic, and decoctions of it have been used in the treatment of intermittent fevers, but it is no longer officinal. The wood is very hard when seasoned, and takes a fine polish. It is one of the two woods most preferred in this country for shuttles, and it is used more for that than for any other purpose. (See Cuno in bibliography; also Kellogg.)

FIG. 63. *Cornus florida*, with trunk 10½ inches in diameter, in pine woods four or five miles west of Bay Minette, Baldwin County. July 22, 1911.

Near cities the trees are damaged a good deal every spring by vandals who tear off whole branches covered with flowers and take them home to admire for a few hours, until they wilt. The invention of automobiles has greatly facilitated this selfish practice, which extends also to the honeysuckle (*Azalea nudiflora* and related species), which blooms at the same time and has much the same distribution; and in recent years many protests against it have appeared in the newspapers of Birmingham and many cities

in other states (for the dogwood ranges nearly throughout the eastern United States), but apparently in vain. However, such depredations on the dogwood are chiefly confined to the immediate vicinity of highways, and do not seem to be perceptibly depleting the supply. (It is still the commonest small tree in and around New York City, where we may assume that it has been ravaged in this way for over 100 years, or ever since people began to take notice of the beauties of nature.) The shuttle-block industry is making more serious inroads on the supply of dogwood, but that utilizes only trees at least five inches in diameter, so that the smaller ones are left to grow larger.

The dogwood grows mostly in dry woods, in the shade of other trees, and avoids the richest and poorest soils. It can stand a little more fire than some of our trees which are chiefly confined to ravines and bluffs. It is common in every region in the state except the Mobile delta, and is probably most abundant in 2 B, 3, and 10 E.*

Cornus alternifolia, L.f.

A large shrub, or small tree, differing from all other dogwoods in having alternate leaves, which are otherwise much like those of the preceding species. The flowers are in loose clusters, like most of the other shrubby species. April.

Grows in rich woods and creek bottoms, pretty well protected from fire. Rather rare. Mostly in the coastal plain with us, though it ranges north to Canada. (Its general distribution is much like that of *Dirca palustris.)*

5. Along Channahatchee Creek, Elmore County.
10E or W. Butler and Covington Counties.
10W. Wilcox, Monroe and Clarke Counties.

Cornus stricta, Lam. (I have not studied this sufficiently to separate it from *C. Amomum* Mill. and one or two others, and am therefore combining them for the present.)

*William Bartram about 150 years ago (Travels, p. 401) reported an almost unbroken forest of dogwood nine or ten miles long on level ground somewhere south of the black belt, but the locality for that, like many other phenomena described by him, cannot now be identified.

A large shrub, sometimes almost a tree; similar in general appearance to the preceding. Sometimes cultivated for ornament; and reputed to have some medicinal properties. Blooms mostly in May.

Grows in swamps and other low places, especially if a little calcareous.

1A or B. (Near?) Athens (Baker & Earle).
2A. Cullman and Blount Counties. (Mostly *C. Amomum?*)
5. Clay County. Lee County (Baker & Earle).
6A. Tuscaloosa County.
7. Hale, Perry, Dallas and Autauga Counties. Montgomery County (Mohr, *C. Amomum*).
10W. Sumter, Choctaw, Wilcox and Butler Counties.
11. Choctaw County.
13 or 14. Mobile and Baldwin Counties (Mohr).

Cornus asperifolia, L.

A shrub similar to the preceding, except that the leaves are rought with minute stiff hairs. (I may have sometimes confused the two.) Grows in rather dry calcareous soils.

1B. (Near?) Russellville (Mohr).
7. Greene and Sumter Counties. Dallas County (Cocks).

NYSSA, Linnaeus. The Black and Tupelo Gums.

Nyssa sylvatica, Marsh. (*N. multiflora*, Wang.) (Common) Black Gum. Often called Pepperidge or Tupelo in the North.)

A medium-sized deciduous tree with no striking characteristics. Blooms mostly in April. Occasionally cultivated for ornament, at least in the North, where it is scarcer than with us, and therefore more appreciated. A "weeping" variety has been developed in cultivation. The wood has an interlaced grain which makes it difficult to split and unsuitable for lumber, but good for mauls, hubs, rollers, ox-yokes, etc. Hollow sections of the trunk were formerly much used in the rural districts for bee-hives, whence the old name for them, "bee-gums." The berries are bitter and neither edible nor medicinal.

Grows mostly in dry woods, in quite a variety of soil, avoiding the richest and poorest. It is commonest northward, but occurs scattered among other trees, with a density of about one tree to the acre, or perhaps less. When it grows in damp places it is not always easy to distinguish from the next.

1A. Lauderdale, Colbert and Limestone Counties, not common.
1B. Madison, Limestone, Morgan and Lawrence Counties.
1C. Colbert County.
2A. Common throughout.
2B. Frequent throughout.
3. Scattered throughout.
4. Common.
5. Clay, Chambers, Chilton, and probably all the other counties.
6A. Scattered throughout.
6B. Tuscaloosa, Hale, Bibb and Elmore Counties.
6C. Greene, Dallas and Autauga Counties.
7. Marengo, Dallas and Macon Counties.
9. Sumter and Wilcox Counties (approaching the next species?).
10E. Scattered throughout.
10W. Choctaw, Clarke, Wilcox, Monroe and Butler Counties; rather rare.
11. Choctaw and Clarke Counties.
13. Baldwin and Escambia Counties.

Nyssa biflora, Walt. *(N. sylvatica biflora,* Sarg.) Black Gum.

(Fig. 64)

Usually a smaller and straighter tree than the preceding, with trunk enlarged at the base somewhat in the manner of the cypresses, and narrower leaves; but there may be all graduations between, especially toward the northern and western limits of this species.

Its economic properties are similar to those of *N. sylvatica,* At Prattville it is used for the disks between the saws of cotton gins, and at Flomaton its wood together with several others has been shaved into thin strips and made into baskets. In recent years, since more desirable woods have become scarce, some of it has been used for cross-ties.

Grows in sour swamps and ponds, usually where the water covers the ground most of the year, but does not fluctuate more than two or three feet with the seasons. Mostly in the coastal plain, where it is often abundant in spots, unlike the preceding species.

2A. Lawrence, Marshall, DeKalb and St. Clair Counties.
2B. Along Hurricane Creek near the "Plank Road," Tuscaloosa County.
3. DeKalb (?), Cherokee and Talladega Counties.
4. Clay County? (Identification doubtful.)
6A. Common from Franklin County southeastward, mostly in creek swamps.
6B. Chilton and Autauga Counties; common.
6C. Rather common throughout.
7. In sandy areas, Dallas, Lowndes and Macon Counties.

FIG. 64. *Nyssa biflora* in shallow pond or swamp on Sand Mountain, Lawrence County. April 19, 1922.

8. Crenshaw, Pike, Macon, Russell and Barbour Counties.
9. Sumter and Wilcox Counties (approaching *N. sylvatica*?)
10E. Common throughout.
10W. Frequent throughout.
11. Choctaw, Washington, Clarke and Monroe Counties.
12. Common throughout, in ponds and swamps.
13. Abundant throughout.
14. The most abundant tree near the lower end of the delta, where it grows tall but somewhat crooked.
15. Baldwin County.

Nyssa uniflora, Wang. (*N. aquatica* L., in part.) Tupelo Gum.

(Fig. 65, Map 22)

A large tree, with rather light wood, especially in the roots. The trunk is often much enlarged at the base, like the cypresses. The leaves and berries are much larger than those of the other two species, and it can be distinguished from them in winter by its coarser twigs. The wood of the trunk has an interlaced grain and is difficult to season without warping, and for those reasons was until recent years considered worthless for lumber, and was used only in the form of logs for pumps and porch columns, thick pieces for bowls (often carved out of living trees), veneers for crates and packing boxes, and thin strips for baskets. So great was the prejudice against it when it was first put on the lumber market that it was called by fictitious names, such as "bay poplar" and "Circassian walnut." But the growing scarcity of other woods has driven lumbermen to use this more and more, and when properly seasoned it is much like yellow poplar *(Liriodendron),* and is adapted to many of the same purposes, such as furniture and interior finish. It is said to be excellent also for mill tramways and the floors of warehouses and freight platforms, because it does not splinter.

The chief use of the wood, however, is veneers used in boxes and crates, for which it is unsurpassed. Smaller quantities go into cigar boxes and musical instruments. The wood of the roots, on account of its lightness, has been used for floats of nets, and has a limited use in surgery. The flowers are an important source of honey.

References: Holroyd.

This species grows in swamps and sloughs, generally where the water varies in depth at different seasons from about one to six feet,* but in Madison County its usual habitat seems to be calcareous spring-fed swamps, which probably do not fluctuate much. It commonly occurs in rather dense pure stands, with hardly any undergrowth, though it may also be scattered along the banks of creeks and rivers.

*See Bull. Torrey Bot. Club 37:121. 1910.

FIG. 65. *Nyssa uniflora* in slough of Tennessee River in Limestone County opposite Decatur. March 14, 1913.

1B. Jackson, Madison, Limestone, Marshall and Colbert Counties. Common in creeks and swamps in southern Madison County, and in the Tennessee River bottoms opposite Decatur.

(2B. Seen in 1913 on bank of Warrior River above Squaw Shoals, near the western corner of Jefferson County, where the water level fluctuated about ten feet, but that locality was destroyed in 1915 by the building of the dam at Lock 17.)

3. On both sides of L. & N. R. R. a mile south of Longview, Shelby County, in a sort of pond or sink. (I have seen this locality from the train, in 1906 and 1927, and explored it on foot on Sept. 30, 1927.)

6A. Lamar, Fayette, Pickens, Tuscaloosa, Hale and Elmore Counties.

6C. Pickens, Hale, Dallas, Montgomery and Macon Counties; common.

7. Greene, Marengo, Dallas and Lowndes Counties.

10E. Near Choctawhatchee River, Geneva County.

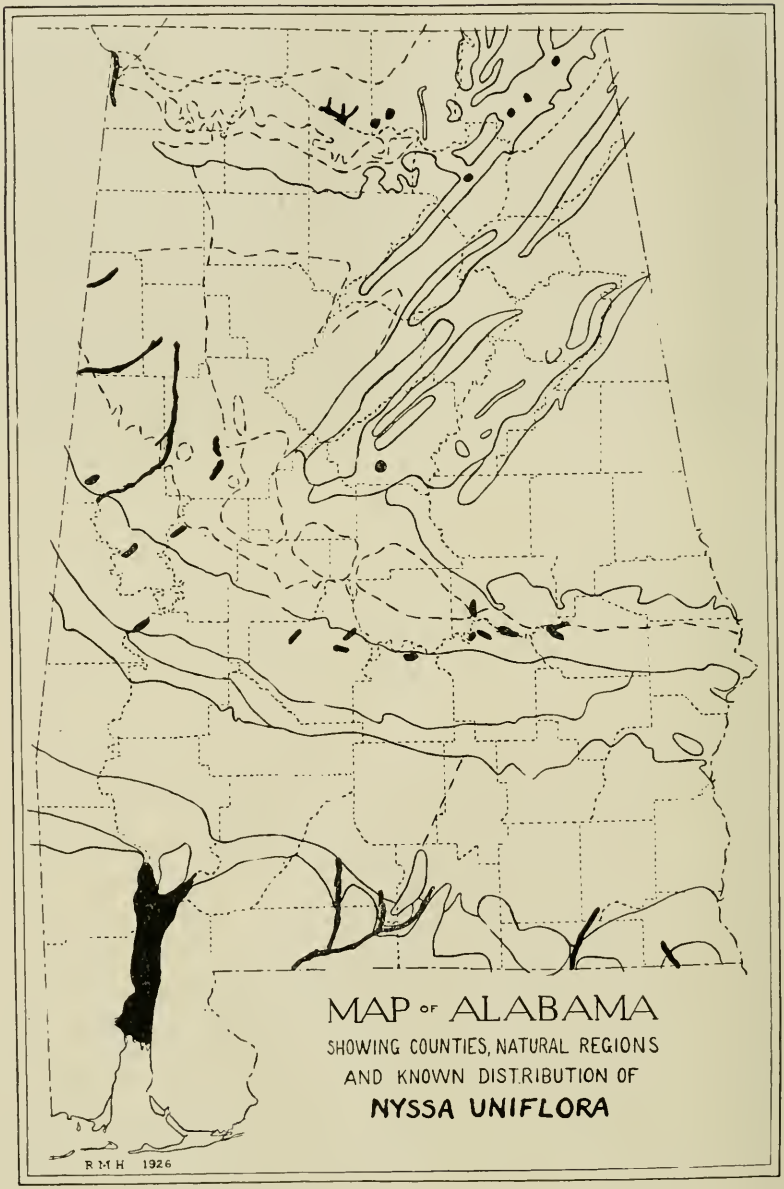
10W. Near Coy, Wilcox County.

11. Conecuh County.

12. Washington and Houston Counties.

13. Along Conecuh River east of Brewton.

14. Fairly common in the lower part of the delta, less so in the upper.



Map 22. Known distribution of *Nyssa uniflora*.

CLETHRACEAE.

A small family, closely allied to the Ericaceae, consisting of the following genus, with about 30 species:

CLETHRA, Linnaeus. (White Alder, Sweet Pepper Bush)

Clethra alnifolia, L. (Including *C. tomentosa*, Lam., which does not seem to differ much.)

A medium-sized erect shrub with toothed deciduous leaves and erect spikes of fragrant creamy-white flowers in July and August. Occasionally cultivated for ornament.

Grows mostly in damp sandy pine lands and on edges of sour swamps, in the coastal plain; but two striking exceptions are noted below (first two regions).

4. Along branches on south slope of the Blue Ridge a few miles from Erin, Clay County.
5. Dry pine hills near Walnut Creek, Chilton County.
6. Reported from the central pine belt by Mohr, but locality not specified.
10E. Crenshaw, Coffee, Dale and Covington Counties.
12. Washington, Covington, Geneva and Houston Counties.
13. Common throughout.

Clethra acuminata, Mx., a larger species, chiefly confined to the mountains of North Carolina, is credited to Alabama by Small, but without definite locality, and probably without sufficient evidence.

ERICACEAE. Heath Family.

A large family, with about 60 genera and 1,200 species, consisting almost entirely of shrubs. They are noted especially for their preference for sour soils, which tends to keep them out of limestone regions and weedy habitats, and also makes most of them difficult to cultivate.

AZALEA, L. The Honeysuckles (commonly so called in the South at least).

The nomenclature and classification of this genus are somewhat unsettled at present. The type species is *Azalea Indica*, a showy shrub cultivated for ornament in the lower South. Our species are all deciduous, but were formerly put in *Rhododendron*, a genus which in the restricted sense contains only evergreens. Wilson and Rehder, in 1921 (see bibliography), treated them as a subgenus *Anthodendron* under *Rhodendron*, and Mr. Ashe in the

same year dug up an old generic name of Japanese origin, *Tsutsusi*, and transferred all our *Azaleas* to it.

Some of the species are quite variable, and just how many distinct forms should be recognized is a problem. Wilson and Rehder credit seven species and subspecies to Alabama, but most of my field work was done before their paper was published, so that it is practically impossible to fit my notes to their treatment. Some of the species bloom in spring and some in summer, and the greatest perplexity is among the vernal species, which differ mostly in color of flowers, and therefore cannot very well be identified when not in bloom. The species are therefore treated here in the older and broader sense, but future investigators may be able to subdivide them better.

Azalea arborescens, Pursh.

A tall shrub with fragrant white flowers, in May and June. Very ornamental, and said to be easy to cultivate.

Grows along small streams in the mountainous parts of the state.

2A. Cullman and DeKalb Counties (Mohr). Pisgah gorge, Jackson County (Harbison). Pointed out to me along Eight-mile Creek, Cullman County, by W. Wolf in September, 1927.

4. Reported from an elevation of 2,200 feet in the Talladega Mountains by Dr. Mohr; and I have seen it at several places on the mountains north of Erin.

5 (?). I have seen what may be this species on the rocky banks of Chestnut Creek in Chilton County, but only in winter, so that I could not be sure of it.

Azalea viscosa, L. (Swamp Honeysuckle) (Including the var. *glauca*, and *A. serrulata*, Small.)

A low shrub with sticky white flowers, in June. The leaves in some forms are bright green, and in others glaucous, which has given rise to varietal distinctions. Sometimes cultivated for ornament.

Grows mostly in sour swamps and bogs.*

4. Waterfall near Pulpit Rock (Mohr).
5. Lee County (Earle & Underwood).
6B. About two miles east of Booth, Autauga County.
13. Mobile County (Mohr). Baldwin and Covington Counties.

*It is reported from Cullman County by Mohr, but Wolf believes he mistook *A. canescens* for it.

Azalea nudiflora, L. (Common Honeysuckle) (Including provisionally *A. canescens* Mx. and *Rhododendron roseum* and *R. Alabamense* Rehder, which might be satisfactorily distinguished if one had sufficient opportunity to study them.)

A familiar shrub, very showy when covered with pinkish flowers in March and April, just before the leaves unfold. The flowers vary from white to red or even orange, but the pink form is by far the most abundant. The white form (which has a large yellow spot on the inside of the flower, on the upper side, and blooms a little later) seems to prevail in the plateau region, and it was referred by Dr. Mohr to var. *alba* Pursh, and by Rehder made the type of a new species, *Rhododendron Alabamense*. The size of the plant seems to depend largely on the frequency of fire. In pine woods, which are burned every year or two, it may bloom when knee-high, while in protected shady places it may grow six feet tall, or more. It is gathered in large quantities by vandals when in bloom, like the dogwood, and is said to be occasionally cultivated for ornament.

Grows in dry or rich woods. Widely distributed over the state, but inconspicuous when not in bloom, so that it is not easy to map its range accurately. About two-thirds of my records for it are dated April, so that my data on its distribution depend largely on what places I happened to visit in that month, and it may be just as common in some counties that I have visited only in summer, fall or winter. It is evidently rare or absent in calcareous and alluvial regions, though, like most other members of this family.

1A. Lauderdale and Limestone Counties.
1C. On and near Little Mountain, Colbert and Lawrence Counties.
2A. Lawrence, Winston, Marshall and Blount Counties (mostly the white form). Cullman County (Wolf, *R. Alabamense*).
2B. Jefferson and Tuscaloosa Counties. (Mostly the pink, but the white form occurs in both counties too.)
3. Talladega, Shelby, Jefferson and Bibb Counties.
4. Calhoun, Clay and Coosa Counties.
5. Common throughout.
6A. Tuscaloosa, Hale, Bibb, Chilton, Autauga, and doubtless in all the other counties.
6B. Tuscaloosa and Chilton Counties.
6C. Hale, Perry and Macon Counties.
8. Montgomery and Pike Counties.
9. Sumter County.
10E. Pike and Covington Counties.

10W. Sumter and Choctaw Counties.
11. Choctaw County.
13. Mobile (Mohr) and Covington Counties.

Azalea lutea, L.

Similar to the preceding, and blooms at the same time, but has orange-colored flowers of slightly different structure. Occasionally cultivated for ornament, and eagerly plucked by vandals if seen blooming near a road. A rare species with us.

2A. Ravines on Sand Mountain, Jackson County (Harbison).

Azalea prunifolia, Small.

Differs from all our other *Azaleas* in having bright red flowers, in midsummer.

Grows in rich woods and ravines, in the eastern division of the southern red hills (region 10 E). Found by the writer in southwestern Georgia in July, 1903, and by Dr. Eugene A. Smith near Baker Hill, Barbour County, in the same month. (It must be rare, for I walked through Baker Hill in July, 1919, without seeing any of it.)

RHODODENDRON, L. The Rhododendrons.

Handsome evergreen shrubs, many of them cultivated for ornament, with numerous horticultural varieties.

Rhododendron Catawbiense, Mx.

One of the most gorgeous of all American shrubs, with beautiful clusters of large pink-purple flowers in early summer. Its praises have been sung by nearly every nature-lover who has visited the southern mountains when it was in bloom. It has been cultivated in Europe for over a hundred years, and many horticultural varieties and hybrids have been derived from it.

Grows on rocky slopes and cliffs, especially near streams, in the eastern part of the plateau region, over 1000 feet above sea-level. Found by Mr. Harbison in Marshall County, and by Prof. Wilson in Jackson. Common for several miles along Little River in DeKalb and Cherokee Counties, particularly above DeSoto Falls.

R. maximum L., a similar but larger species, is credited to Alabama by Small, but without definite locality. It may grow somewhere in the northeastern part of the state, for it is found not far away in Georgia.

Rhododendron punctatum, Andr. (or *R.Cuthbertii,* Small?).

Smaller in every way than the preceding, but quite ornamental, and offered for sale by some nurserymen.

Grows in rocky ravines and on bluffs, protected from fire.

5. Tallapoosa County (Earle). Northwestern Coosa and eastern Chilton Counties*, especially along Walnut Creek in the latter, though some of it has recently been drowned out by back-water from the Mitchell Dam.

8 (?). Near Eufaula (Chapman).

Menziesia pilosa (Mx.) Pers. (*M. globularis,* Sal.) a deciduous shrub, is credited to the mountains of Alabama by Small, but that is probably a mistake, for it is chiefly confined to the mountains of North Carolina, and is not certainly known even from Georgia, which has mountains twice as high as any in Alabama.

KALMIA, L. The Laurels (but not of ancient literature).

Kalmia latifolia, L. (Called Ivy in the South and Mountain Laurel in the North, and also sometimes Calico Bush and Spoon-wood.)

(Fig. 66)

A large handsome evergreen shrub with clusters of pinkish flowers in April and May. I have seen it with stems six inches in diameter and twenty feet tall in Covington County, and it is said to grow still larger in the mountains of North Carolina, where it is sometimes classed as a tree. It is often cultivated for ornament, and is hardy almost anywhere in the eastern United States. The wood is hard and close-grained, but of too small dimensions to be good for much but fuel, rustic furniture, tool-handles and tobacco pipes.

This species has a well-established reputation for being poisonous to cattle. It is usually the leaves that do the damage, but a resident of Marion County once expressed the belief that it was only the pods that were poisonous. It does not usually grow in places frequented by cattle, though. The flowers furnish honey, which, however, is suspected of having narcotic properties.

Grows on non-calcareous bluffs and cliffs, in hammocks, ravines, etc., usually in shady places where there are no earthworms in the soil and fire is rare or impossible.†

*See Bull. Torrey Bot. Club 33:534. 1906.

†See Torreya, 15:30. Feb. 1915.

FIG. 66. Near view of *Kalmia latifolia* in ravine on Lookout Mountain, about three miles southeast of Fort Payne, DeKalb County. Walter B. Jones, May 31, 1926.

1A. Lauderdale and Colbert Counties.
1C. Colbert County.
2A., 2B. Frequent or common on rocky bluffs and banks of streams.
3. Talladega, Shelby, Jefferson, Bibb and Tuscaloosa Counties.
4. Common on cliffs and in ravines.
5. Frequent, except perhaps in Chambers and Lee Counties.
6A. Scattered throughout.
6B. Hale, Bibb, Autauga and Elmore Counties. In this region its usual habitat is in gullies among the high pine hills, where there is almost no shade or humus, but practically perfect protection from fire.
6C. High hills near Prattville. Along Valley Creek about three miles north of Selma.
10B. Pike, Dale, Coffee and Covington Counties.
10W. Choctaw, Clarke, Monroe and Butler Counties, mostly in the Buhrstone mountains.
11. Choctaw and Monroe Counties.
12. Washington and Geneva Counties.
13. Washington, Mobile, Escambia and Covington Counties.

Kalmia hirsuta, Walt. (Wicky).

A low shrub, about a foot tall, with bristly stems, small evergreen leaves, and pink-purple flowers in summer. Economic properties unknown.

Grows in damp sandy pine lands. (Less common in Alabama than in Georgia and Florida.)

13. Near Josephine, Baldwin County.
15. South of Orange Beach, Baldwin County.

LEUCOTHOE, D. Don.

Leucothoe axillaris (Lam.) Don.

A low, almost unbranched shrub with curving stems, toothed evergreen leaves, and waxy-white flowers (much like those of the huckleberries) in late spring. Shipped from Evergreen for winter decorations, and would probably be cultivated for ornament if it was better known. Believed to be poisonous to cattle.

Grows in wet woods in the lower parts of the coastal plain.

10E. Coffee and Covington Counties.
11. Murder Creek swamp near Evergreen.
13. Spring-head about 5 miles west of Bay Minette. Along Franklin Creek north of Grand Bay.

Leucothoe racemosa (L.) Gray.

A slender deciduous shrub with small white flowers in slender drooping clusters, in late spring or early summer.

Grows in or around non-alluvial swamps, ponds, bays, etc., in the coastal plain.

10W. Marengo and Butler Counties.
12. Cypress pond near Gordon, Houston County.
13. Around Lake Jackson near Florala. Mobile and Baldwin Counties (Mohr).
15. Swamp near Point Clear, Baldwin Co.

L. recurva (Buckl.) Gray, a mountain species related to the preceding, was credited to Alabama by Dr. Gray (in his Synoptical Flora of North America), but without definite locality.

PIERIS, D. Don.

Pieris nitida (Bartr.) B. & H. (Hurrah Bush [Ga.]. Horsewicky [Fla.])

An evergreen shrub with numerous huckleberry-like pinkish flowers in March and April. I have seen it ten feet tall in Chilton County, but it is usually less than half that height. Its economic properties are unknown, except that it is occasionally cultivated for ornament.

Grows in sandy bogs and sour swamps; almost confined to the coastal plain.

5. Along Chestnut Creek east of Verbena, Chilton County.
6A. Chilton County.
6B. Autauga County; rather common.
10E. Dale County.
10W. Sumter County.
11. Washington County.
12. Washington, Covington and Houston Counties.
13. Frequent nearly throughout.
15. Common near Orange Beach, Baldwin County.

Pieris phillyreifolia (Hook.) DC.

Differs from all other Ericaceae in being usually a vine, and from all other known vines in that it climbs cypress trees *(Taxodium imbricarium*, never *T. distichum)* by creeping up under the outer bark, often to a height of twenty or thirty feet, and sending out branches every few feet, that look as if they were growing right out of the tree.* More rarely a small shrub standing alone, two or three feet tall. Evergreen. Blooms in February.

Grows mostly in cypress ponds. (Commoner in Georgia and Florida.)

12. Ponds south of McRae, Covington County, and east of Gordon, Houston County.
13. Around Lake Jackson, Covington County. Mobile County (Mohr).

*See Torreya 3:21-22. 1903. Bull. Torrey Bot. Club 35:534. 1906.

CHOLISMA, Raf. (Originally misspelled *Xolisma,* doubtless because the Greek letter corresponding to Ch looks exactly like our X. See Greene, Torreya 4:173-174. 1904.)

Cholisma ligustrina (L.) Britton. (*Andromeda ligustrina,* Muhl.)

A deciduous shrub, blooming in late spring. It varies in size with soil conditions, etc., and some of the dwarf forms have been given varietal names. Sometimes cultivated for ornament.

Grows in wet woods, edges of swamps, etc.

2A. Cullman County
4. Clay County.
5. Clay County. Lee County (Earle & Underwood).
6A. Franklin and Tuscaloosa Counties.
6B. Autauga County.
6C (?). Montgomery County (Mohr).
13. Near Oak, Baldwin County (the dwarf form).

OXYDENDRUM, DeCandolle. (Only one species.)

Oxydendrum arboreum (L.) DC. SOURWOOD.

A slender tree, in favorable situations becoming a foot in diameter and forty or fifty feet tall, with pointed deciduous leaves and small clustered huckleberry-like flowers in June. The flowers have their mouths pointing downward, but the pods (like nearly all capsular fruits) are erect, so that the seeds do not all drop as soon as the pods open, but are scattered gradually by the wind.

Sometimes cultivated for ornament. The wood is heavier than water when green, and hard, close-grained, and susceptible of polish, but there is not enough of it in large dimensions to be of much economic importance. It might possibly be good for shuttles. The young shoots are very straight, and are occasionally used by boys for arrows. The leaves and bark are medicinal, but not officinal. The flowers furnish honey.

Grows in dry woods, hammocks, bluffs, creek-bottoms, etc., and seems to avoid the richest, poorest and wettest soils, and too frequent fires. Its distribution corresponds approximately with those parts of the state where more than 1% and less than 10% of the area was cultivated in cotton in 1880.

1A. Lauderdale and Colbert Counties.
1B. Limestone slopes east of Guntersville.
1C. Colbert County.
2A. Scattered throughout.
2B. Frequent.

3. On chert ridges, etc. DeKalb, Blount, Jefferson and Bibb Counties.
4. Common.
5. Scattered. Randolph, Tallapoosa, Elmore, Chilton, and probably all the other counties.
6A. Franklin County to Chilton.
6B. Tuscaloosa County to Autauga.
6C. Greene, Dallas, Autauga and Elmore Counties.
7. Near Sardis, Dallas County.
8. Pike, Barbour and Russell Counties.
9. Sumter County.
10E. Frequent throughout.
10W. Choctaw, Clarke, Wilcox, Monroe and Butler Counties.
11. Choctaw, Clarke, Monroe and Conecuh Counties.
12. Washington and Geneva Counties; rare.
13. Mobile, Baldwin and Covington Counties; rare.

VACCINIACEAE. Huckleberry Family.

This family, with about 25 genera and 325 species, mostly shrubs, was formerly combined with the Ericaceae, which it resembles in flower structure and general appearance, and also in having a partiality for acid soils; but it is now separated on the technical character of having the ovary inferior, i. e., united with the calyx nearly to the top. The fruit is a berry, edible in most species; and the leaves do not seem to be poisonous, as those of many Ericaceae are.

GAYLUSSACIA, Humboldt, Bonpland & Kunth. The Huckleberries.

Gaylussacia dumosa (Andr.) T. & G. (Gopher-berry).

A low evergreen almost unbranched shrub, a foot or less in height, with white bell-shaped flowers in April and May and black berries in summer and fall. The berries are edible, but not very sweet or abundant.

Grows in dry open woods with siliceous soil, especially in long-leaf pine regions.

2A. Cullman and DeKalb Counties.
2B. Walker and Tuscaloosa Counties.
3. DeKalb, Etowah and Talladega Counties, mostly on chert ridges.
4. Talladega and Clay Counties.
5. Cleburne, Tallapoosa, Elmore and Chilton Counties.
6B. Tuscaloosa, Hale, Bibb, Chilton, Autauga and Elmore Counties.
6C. Autauga County.
9. Sumter County.
10E. Pike County.
10W. Choctaw and Monroe Counties.
12. Washington and Covington Counties.
13. Mobile, Clarke, Baldwin, Covington and Geneva Counties.

Gaylussacia hirtella (Ait.f.) Klotzsch. (Including *G. Mosieri,* Small)

Similar to the preceding, but usually taller, with bristly stems and berries. Fruit ripe in June and July, insipid.

Grows mostly in sandy bogs, in the lower parts of the coastal plain.

12. Washington and Geneva Counties.
13. South of Andalusia, Covington County. Swamp of Franklin Creek, north of Grand Bay, Mobile County.

Gaylussacia frondosa (L.) T. & G. HUCKLEBERRY.

A slender deciduous shrub often several feet tall, with inconspicuous greenish flowers and fine bluish berries, very good to eat. It runs into several varieties, which seem to differ chiefly in size, and are hardly worth enumerating. Blooms in April, fruit ripe in June.

Grows in low pine lands, sandy bogs, etc. Confined to the coastal plain, or nearly so.

5 (?). (Near?) Auburn (Earle & Underwood).
6A. Chilton County.
12. Washington, Geneva and Houston Counties.
13. Mobile County (Mohr). Baldwin and Geneva Counties.

BATODENDRON, Nuttall. (TREE HUCKLEBERRIES).

Batodendron arboreum (Marsh.) Nutt. *(Vaccinium arboreum,* Marsh.) SPARKLEBERRY, or WINTER HUCKLEBERRY

A large shrub or small tree, evergreen or nearly so, with white flowers in May and rather dry and gritty black berries hanging on most of the winter. Dr. Mohr found specimens as much as ten inches in diameter and thirty feet tall.

In its stems, bark and wood this species resembles *Kalmia latifolia,* and its wood can probably be used for the same purposes. The leafy twigs are sometimes shipped north for decorative purposes. The berries can be eaten, but they are hardly worth the trouble of picking.

Inhabits dry woods, rocky bluffs, cliffs, mountain summits, sandy hammocks, and other places protected from fire and floods, in nearly all parts of the state where less than 10% of the area was cultivated in cotton in 1880. It will grow in richer soils than most of the Ericaceae, but seems to avoid distinctly calcareous soils.

1A. Lauderdale and Colbert Counties.
1B. Madison, Limestone and Colbert Counties.
2A. Common throughout.
2B. Walker, Jefferson and Tuscaloosa Counties.
3. Talladega, Jefferson and Bibb Counties.
4. Common nearly throughout.
5. Cleburne, Tallapoosa, Elmore and Chilton Counties.
6A. Franklin County to Elmore County.
6B. Common.
6C. Greene and Autauga Counties.
7. On loamy hills, Greene County; second bottoms south of Selma, Dallas County; near Catoma Creek, Montgomery County.
8. Pike County.
9. Sumter County.
10E. Frequent throughout.
10W. Choctaw, Monroe and Butler Counties.
11. Choctaw, Washington and Clarke Counties.
12. Washington, Geneva and Houston Counties.
13. Mobile, Baldwin, Escambia and Covington Counties.
15. Baldwin County.

POLYCODIUM, Rafinesque. Gooseberries (so called in the South, not in the North).

Deciduous shrubs, with small bell-shaped white or whitish flowers, and berries that in most forms are rather bitter and hardly considered edible, though some of them make pretty good jelly. Originally this genus included but one species, the first named below (*Vaccinium stamineum,* L.), but in the last few decades several new forms have been described which are difficult to distinguish, and the number of species which should be recognized is uncertain.

Polycodium stamineum (L.) Greene.
(Deerberry. Squaw Huckleberry).

Usually about three feet tall, with pretty little cream-colored flowers in April and greenish berries in summer. Sometimes cultivated for ornament.

Grows in dry and moderately rich woods. One or two other forms may have been confused with it in my notes.

2A. Lawrence and Winston Counties.
2B. Near Lock 14, Tuscaloosa County.
4. Talladega and Clay Counties.
5. Near Lafayette, Chambers County.
6A. Tuscaloosa and Chilton Counties.
6B. Tuscaloosa and Hale Counties, rather rare.
9. Sumter County.
10W. Choctaw County.

Polycodium melanocarpum (Mohr) Small. (Including two varieties described by Mohr, one of which is treated as a species by Small.)

According to Dr. Mohr this grows from two to four feet tall and has shiny black berries which ripen earlier than those of *P. stamineum* and are very good to eat.

1A. Lauderdale County (Mohr).
2A. DeKalb County. (Var. *sericeum*, Mohr).
3. St. Clair County. (Var. *sericeum*, Mohr).
5. Lee County (Baker & Earle). (Var. *candicans*, Mohr).

VACCINIUM, Linnaeus. BLUEBERRIES, etc. (Generally called HUCKLEBERRIES in the South.)

All shrubs, and all but one of ours deciduous. They bloom in spring, about the time the leaves unfold, and ripen their fruit in early summer. All or nearly all have edible berries, of some commercial importance, and some are cultivated for that reason, or for ornament. They grow mostly in siliceous soils, and are common throughout the state, except in the Tennessee Valley and the black belt.

Our species of this genus are not easy to distinguish without having both flowers and fruit, and that condition is not easily fulfilled when one is trying to cover a whole state in a few years. For that reason I can add very little to what is said about them in Mohr's Plant Life of Alabama, where ten species and varieties of *Vaccinium* proper are enumerated. One or two more are credited to Alabama in Small's Flora of the Southeastern United States, but four or five is about all that I have distinguished.

Vaccinium Myrsinites, Lam. (*V. nitidum,* Andr.?) (Including the var. *glaucum,* which seems to differ only in having the foliage glaucous, a variation which occurs in many other plants, and does not seem to signify much.)

A low much-branched shrub, usually about a foot tall, with small evergreen leaves, blooming in March and April. The berries are few and small, and not very sweet.

Grows in dry sunny siliceous soils, especially in long-leaf pine forests.

5. Clay County (Mohr). Bald Knob, Elmore County. Lee County (Baker & Earle).
6A. Chilton County.
6B. Autauga County.
9. Sumter County.
10W. Mostly on the Buhrstone mountains. Choctaw County. Clarke County (Mohr). Monroe County.
12. Iron Mountain near Healing Springs, Washington County.
13. Mobile County (Mohr). Baldwin County.
15. Inner edge of dunes near Orange Beach, Baldwin County.

Vaccinium vacillans, Kalm.

A low much-branched deciduous shrub, about a foot tall.

Grows in dry non-calcareous woods, with few or no earthworms in the soil, and pretty good protection from fire. Berries abundant and good.

1C. Colbert County.
2A. Lawrence, Winston, Cullman, Blount and DeKalb Counties.
2B. Dry bluffs near Warrior River, Tuscaloosa County.
3. DeKalb and Talladega Counties.
4. Rather common on ridges.
5. Cleburne County. Lee County (Baker & Earle).
6C or 7. House Bluff, Autauga County.
10W. Monroe County.

Vaccinium Elliottii, Chapm.

A deciduous much-branched shrub several feet tall, with small leaves. (I may have confused one or two other species with it.) Berries small and not very abundant.

Grows mostly in dry woods protected from fire, and on creek banks.

2A. Cullman and DeKalb Counties.
2B. Fayette and Tuscaloosa Counties.
4. Rich damp ravine, Clay County.
5. Chilton and Coosa Counties. Lee County (Baker & Earle).
6A. Pickens, Tuscaloosa and Hale Counties.
6B. Bibb and Autauga Counties.
6C. Pickens and Autauga Counties.
10W. Choctaw County. Near Claiborne (Mohr).
12. Chalk Hill, near Healing Springs, Washington County.
13. Escambia and Mobile Counties.
15. Baldwin County.

Vaccinium corymbosum, L. (With several varieties or related species.) (High-bush Huckleberry)

A tall shrub, with larger leaves than these previously mentioned, and excellent berries.

Grows in wet woods and sour swamps. Not as common in Alabama as in some states farther north and east.

2A. Winston, Cullman and DeKalb Counties (Mohr; including *V. pallidum*).
4. Clay County.
5. Lee County (Baker & Earle).
6A. Marion County.
6B. Autauga County.
6C. Prattville (Mohr; *V. fuscatum*).
13 or 14. Near David's Lake, Mobile County (Mohr; var. *amoenum*).
15. Near Zundel's, Baldwin County (Mohr, *V. fuscatum*).

EBENACEAE. Ebony Family.

About 7 genera and 215 species, trees and shrubs, mostly tropical.

DIOSPYROS, Linnaeus.

This genus includes over 100 species, mostly Asiatic, some yielding fruit and some valuable wood. The ebony is one of them.

Diospyros Virginiana, L. Persimmon.

A medium-sized deciduous tree, too well known to every southerner to require any description. The wood is very heavy, hard, strong and compact, and is one of the best for shuttles. It is said to be also used for boot and shoe findings and interior finish. (See Cuno and Fletcher in bibliography.) The green fruit is very astringent, and dyes fabrics black. Decoctions of it and of the bark have been used medicinally. The ripe fruit is sweet and edible, and seems to run into several varieties, differing in shape, size, number of seeds, time of ripening, etc. Some are almost seedless.

There is a widespread belief or tradition that the persimmon fruit does not lose its astringency until after frost; and that may be true toward its northern limits, and of some individual trees in all parts of its range, but I have seen ripe ones in Autauga County the last week in August, and they can probably be found almost anywhere in the state by the middle of September. The fruit could probably be improved by cultivation, but that does not seem to have been undertaken yet.

The persimmon is widely distributed over the state, in almost every kind of soil, but it is mostly a weed in old fields and along

roadsides, and it must have been very scarce before the country was settled. It appears as if indigenous in a few places, though, particularly on limestone in the Tennessee Valley, and on the banks of the Warrior River in the northern part of Jefferson County. Trees of this species are usually solitary, and located in places pretty well protected from fire; but, as in the case of the sassafras, one often finds shrubby immature specimens growing abundantly in old fields, and also in pine lands that are burned over occasionally.

Although the persimmon is very common, it makes up a very small fraction of the total stand of timber in the state. (It seems to be less abundant in Alabama than in Georgia, though that would be hard to prove statistically.) It is apparently rare in regions 1A, 2A, 14 and 15, and commonest in 3, 6A and 10W.

SAPOTACEAE. Sapodilla Family.

Includes about 50 genera and 425 species of woody plants, mostly tropical, some of them important for fruit or other products. Represented in the United States only by the following genus, and one or two others which do not range north of Florida.

BUMELIA, Swartz. (Seems to have no common name in general use.)

Bumelia lanuginosa (Mx.) Pers.

A small deciduous tree, with leaning or crooked trunk less than a foot in diameter, and rather hard and tough wood. Flowers and fruit not often seen. According to Prof. Sargent, the tree, when wounded, exudes a sticky gum, and the wood is well suited for cabinet-making.

Grows in sandy hammocks and other dry places not subject to fire.

1B. (Near?) Russellville (Mohr; perhaps the next species?).
5. Cliffs on Coosa River about seven miles above Wetumpka, Elmore County.
7. Along Catoma Creek, Montgomery County. Dallas County (Cocks). Near House Bluff, Autauga County.
10E. In the "pocosin," Pike County. Also in Coffee County.
13 (?). Mobile County (Mohr).

Bumelia lycioides (L.) Gaert.

A small tree, but taller and straighter than the preceding, partly evergreen, and peculiar in the fact that the leaves do not change color in the fall, but remain green until they drop off at intervals through the winter. This is one of the few Alabama trees which seems not to be known or used by the natives.

Grows on calcareous and shaly slopes, river-banks, etc.

1B. Jackson, Madison and Morgan Counties, on limestone.
2B. Shaly bluffs near Simpson's Creek, Cullman County; rare. Bluffs on Warrior River, Tuscaloosa County.
3. Etowah, Blount, St. Clair and Jefferson Counties.
7. Dallas and Marengo Counties.
10E. Rich woods east of Ozark, Dale County.
10W. Wilcox County (Buckley).
11. Bank of Murder Creek, Conecuh County.
12. Limestone outcrop near Gordon, Houston County.

SYMPLOCACEAE. (Comprises only the following genus).

SYMPLOCOS, Linnaeus.

A large genus of trees and shrubs, mostly in eastern Asia and the tropics. Only the following occurs in North America.

Symplocos tinctoria (L) L'Her.

Sweet-leaf, Sweet Bay. (Horse-Sugar).

A large shrub or small tree much like a bay in appearance, evergreen or nearly so, with yellowish flowers in March and April. In Chilton County I have seen a tree about nine inches in diameter and forty feet tall, but it is usually a shrub only a few feet tall. It is ornamental and easily cultivated, but apparently seldom if ever handled by American nurserymen. According to Sargent, it was formerly cultivated in England. F. A. Michaux said of it about 100 years ago that its wood was totally useless. The leaves have a sweet taste, and are relished by grazing animals. They and the bark yield a yellow dye.

This species inhabits rich woods, bluffs, etc., pretty well protected from fire, mostly in those parts of the state where less than 15% of the area was cultivated in cotton in 1880.

1B. Falkville, Morgan County (Mohr).
2A. Occasional throughout.
2B. Fayette, Walker, Jefferson and Tuscaloosa Counties.
3. Along Cahaba River above Pratt's Ferry, Bibb County.
4. Clay and Coosa Counties.
5. Clay, Coosa, Chilton and Elmore Counties.

6A. Marion County to Elmore.
6C. Pickens and Autauga Counties.
7. Dallas County (Cocks).
9. Sumter County.
10E. Pike, Coffee and Dale Counties.
10W. Choctaw, Marengo and Butler Counties.
11. Near Evergreen, Conecuh County.
13. Mobile, Clarke, Baldwin, Escambia and Covington Counties.

STYRACACEAE. Storax Family.

About six genera and 115 species, trees and shrubs, widely distributed in tropical and warm-temperate regions.

STYRAX, Linnaeus. (Apparently no common name in these parts)

Shrubs, with roughish leaves, rather handsome white flowers, and small dry berry-like fruits. Some of them are occasionally-cultivated for ornament elsewhere, but the people in this part of the world seem to have no name or use for them.

Styrax grandifolia, Ait.

A large shrub, sometimes almost a tree, with broad leaves much like those of *Halesia diptera* (see below). When not in fruit it might easily be mistaken for a young specimen of that tree. Blooms in April and May.

Grows mostly in the coastal plain, and in dry places protected from fire.

2A. Cullman County, near creeks.
2B. Bluffs along Warrior River near Locks 14 and 16, Tuscaloosa County.
5(?). (Near?) Auburn (Baker & Earle).
6B. Near Duncanville, Tuscaloosa County (W. W. Ashe, Aug. 1926).
6C. Ravines southwest of Booth, Autauga County.
10W. Mountains near West Butler, Choctaw County. Mt. Sterling (Mohr).
11. North of Silas, Choctaw County. Clarke County (Denny).
13. Mobile and Baldwin Counties (Mohr).

Styrax Americana, Lam.

Differs from the preceding chiefly in having more branches and smaller leaves, and in its habitat.

Grows in wet woods and swamps of various kinds, mostly non-alluvial.

2A. Cullman and DeKalb Counties (Mohr). Lookout Mountain, Etowah County.
5. Tallapoosa and Lee Counties (Baker & Earle).

6A. Swamp of Yellow Leaf Creek, Chilton County.
6C. Common along Autauga Creek near Booth.
10W. Near Vredenburgh, Monroe County.
12. Covington County.
13. Clarke and Baldwin Counties.
13 or 15. In the flat country west of Mobile Bay.
14. Near Stockton, Baldwin Co. (Mohr).

Styrax pulverulenta, Mx.

Smaller than the preceding, and perhaps only a dwarf form of it.

Grows in wet pine lands, in the southwestern pine hills (region 13). Reported from Washington, Mobile and Baldwin Counties by Dr. Mohr.

HALESIA, Ellis *(Carlomohria,* Greene; *Mohrodendron,* Britton).

Small or medium-sized deciduous trees with drooping bell-shaped white flowers in April, and curious dry winged indehiscent fruits in fall. Our two species are not well known to the residents of the regions where they grow, but in other states they have been called Cottonwood, Possumwood, Tisswood, Cow-licks, Silver Bell Tree, etc.

Halesia Carolina, L. *(H. tetraptera,* L.; *H. monticola,* Sarg.?)

A tree sometimes two feet in diameter and sixty feet tall, but usually less than half those dimensions. Often cultivated for ornament in the North, less frequently in the South. A horticultural variety has been described.

Grows in rich woods, especially near rivers. Not very common.

1A. Lauderdale County (M. C. Wilson).
1B. Colbert County.
2A. Cullman and Cherokee Counties.
4. Talladega (Mohr) and Coosa Counties.
5. Clay and Elmore Counties.
6C. Along Alabama River, Montgomery County. Autauga County.
7. Dallas County (Cocks).
10E. Coffee County.
10W. Butler.
11. Clarke County.

Halesia diptera, L.

Differs from the preceding chiefly in having two wings on the fruit instead of four; but its range and habitat are also different.

Grows in sandy hammocks, on river-banks, etc., mostly in the coastal plain.

5. Along Coosa River in Chilton and Elmore Counties and Tallapoosa River and Channahatchee Creek in Elmore.

6C. Along Alabama River, Montgomery County, Macon County (C. H. Schaeffer, 1927).

7. Along Catoma Creek, Montgomery County. Dallas County (Cocks).

10E. Coffee and Covington Counties.

10W. Wilcox, Choctaw and Butler Counties.

11. Choctaw County. Clarke County (Denny). Gopher Hill on Tombigbee River, Washington County.

12. Along Pea River, Geneva County.

13. On Conecuh River, Escambia County. Mobile County (Mohr).

13 or 15. West side of the bay a few miles below Mobile.

Halesia parviflora, Mx., is reported from Lee County by Sargent (Jour. Arnold Arb. 2:175. 1921).

OLEACEAE. Olive Family.

About 25 genera and 500 species, trees and shrubs, in tropical and temperate regions, mostly in the northern hemisphere. Some are timber trees (e.g., ash), some are cultivated for ornament (lilac, etc.), shade, hedges (privet) or fruit (olive), and some are medicinal.

FRAXINUS, L. The Ashes.

Trees, with opposite compound deciduous leaves and dry winged fruits. At least six species have been credited to Alabama, but they look much alike, and are not easy to distinguish when not in fruit, or when one passes them rapidly. The following notes on distribution therefore cannot be regarded as complete and final. Besides those listed below, *F. Biltmoreana* and *F. Pennsylvanica* have been credited to Alabama, but I have not identified them.

Most of the species are useful for their wood, and some are planted for shade or ornament. For valuable notes on their economic properties, etc., see papers by Sterrett cited in the bibliography.

Fraxinus Americana, L. (Common or White) Ash.

The most widely distributed and best known species, and apparently the one most frequently cultivated. Its wood is rather hard and elastic, straight-grained, seasons and works well, and is used for bats, oars, handles, furniture, woodenware, interior finish, parts of cotton gins, carriages and agricultural implements, and

various other purposes. It also makes excellent fuel. The bark has been used in domestic medicine, and the leaves are said to repel rattlesnakes.*

Grows in rich woods, on river-banks, etc.

1A. Limestone County.
1B. Frequent.
2B. Bluffs near Simpson's Creek, Cullman County. Fayette, Walker, Tuscaloosa and Bibb Counties.
3. Frequent.
5. Clay, Chilton and Elmore Counties.
6A. Greene County.
7. Sumter and Dallas Counties.
8. Montgomery and Barbour Counties.
9. Sumter County.
10E. Pike, Dale and Coffee Counties.
10W. Sumter, Choctaw, Wilcox, Monroe and Butler Counties.
11. Choctaw, Washington, Clarke and Monroe Counties.

Fraxinus lanceolata, Borkh.

Grows mostly on river-banks. Probably widely distributed (said by Dr. Mohr to range "throughout the state"), but not identified by the writer until May, 1921, when it was observed to be one of the commonest trees along the Locust Fork of the Warrior River, all the way across Jefferson County. I have since seen what is probably the same thing in Morgan, Bibb, Dallas and Butler Counties, and in the upper part of the Mobile delta.

Fraxinus Caroliniana, Mill. (*F. platycarpa,* Mx.) (Pop-ash)

A small leaning or crooked tree of little economic importance, growing in swamps of various kinds, mostly in the coastal plain.

2B. Formerly on Squaw Shoals, Tuscaloosa County, but destroyed by the "Lock 17" dam in 1915.
3. St. Clair County (Mohr, Plant Life, p. 67).
6A. Tuscaloosa County.
7. Dallas (Cocks) and Montgomery Counties.
8. Russell County.
10E. Dale and Covington Counties.
10W. Butler County.
11. Clarke and Conecuh Counties.
14. Mobile County.

Fraxinus quadrangulata, Mx. (Blue Ash).

A small or medium-sized tree. Sometimes cultivated for ornament. The wood is considered desirable for handles of pitchforks and similar tools. The inner bark is said to yield a blue dye.

*See Samuel Woodruff, Am. Jour. Sci. 23:337-339. 1833.

Grows mostly on outcrops of limestone or shale.

1B. Jackson County. Madison County (Mohr).

2B. On bluffs of Warrior River about 10 and 25 miles above Tuscaloosa (if identified correctly).

ADELIA, P. Browne. (*Forestiera*, Poir.)

Shrubs or small trees, uncommon and unimportant, so that they seem to have no generally recognized common names.

Adelia acuminata, Mx. (*Borya acuminata*, Willd.)

A deciduous shrub or small crooked tree with several trunks, with inconspicuous greenish flowers in March and April. Occasionally sold by nurserymen, and recommended by them for hedges.

Grows on banks of rivers that fluctuate several feet during the year; often associated with *Planera*. Chiefly in the western half of the state.

1. On Tennessee River near Florence and Sheffield. Some specimens seen there about 6 inches in diameter and 25 feet tall. (See Bull. Torrey Bot. Club 33:554. 1906.) Also near Plymouth Rock Landing, Morgan County.

6C. On Alabama River, about two miles north of Montgomery, and at House Bluff, Autauga County.

7. On Tombigbee River in Sumter County opposite Demopolis. On Alabama River in Dallas and Wilcox Counties.

8. On Tombigbee River in Sumter and Marengo Counties.

10W. On Tombigbee River in Marengo and Choctaw Counties.

11. Choctaw, Clarke and Monroe Counties, on Tombigbee and Alabama Rivers.

14. Near Mount Vernon and Stockton (Mohr).

Adelia ligustrina, Mx.

A slender but rather tall shrub. Sometimes cultivated for ornament. According to Dr. Mohr's observations it ought to be a good honey plant.

Grows mostly on limestone outcrops and river banks, where it is well protected from fire.

1B. Common on limestone slopes in Madison and Morgan Counties, and seen in similar situations in Franklin and Blount. In small limy prairie near Spring Valley, Colbert County.

2B. Shale bluffs on Warrior River, Tuscaloosa County.

3. Calcareous flatwoods near McCalla, Jefferson County. Near Pratt's Ferry on Cahaba River, Bibb County (Mohr).

12. Sandy banks of Choctawhatchee and Pea Rivers, Geneva County.

CHIONANTHUS, Linnaeus. (The Fringe Trees.)

Comprises two or three species of shrubs or small trees, in the eastern United States and China.

Chionanthus Virginica, L.

Grandsir Graybeard. (White Ash).

A large shrub, or sometimes a small tree three or four inches in diameter and twenty feet tall, with opposite deciduous leaves, delicate but showy white flowers in lace-like clusters in April (or earlier southward and later northward), and bluish-black plum-like (inedible) fruits in fall. Inconspicuous when not in bloom. Often cultivated for ornament. A decoction of the bark of the root has tonic and anti-periodic properties, and is used locally for snake-bites, fevers, and various horse ailments. It is said also to enter into the composition of some well-known patent medicines.

Grows in moderately rich woods, hammocks, etc., where fire is infrequent.

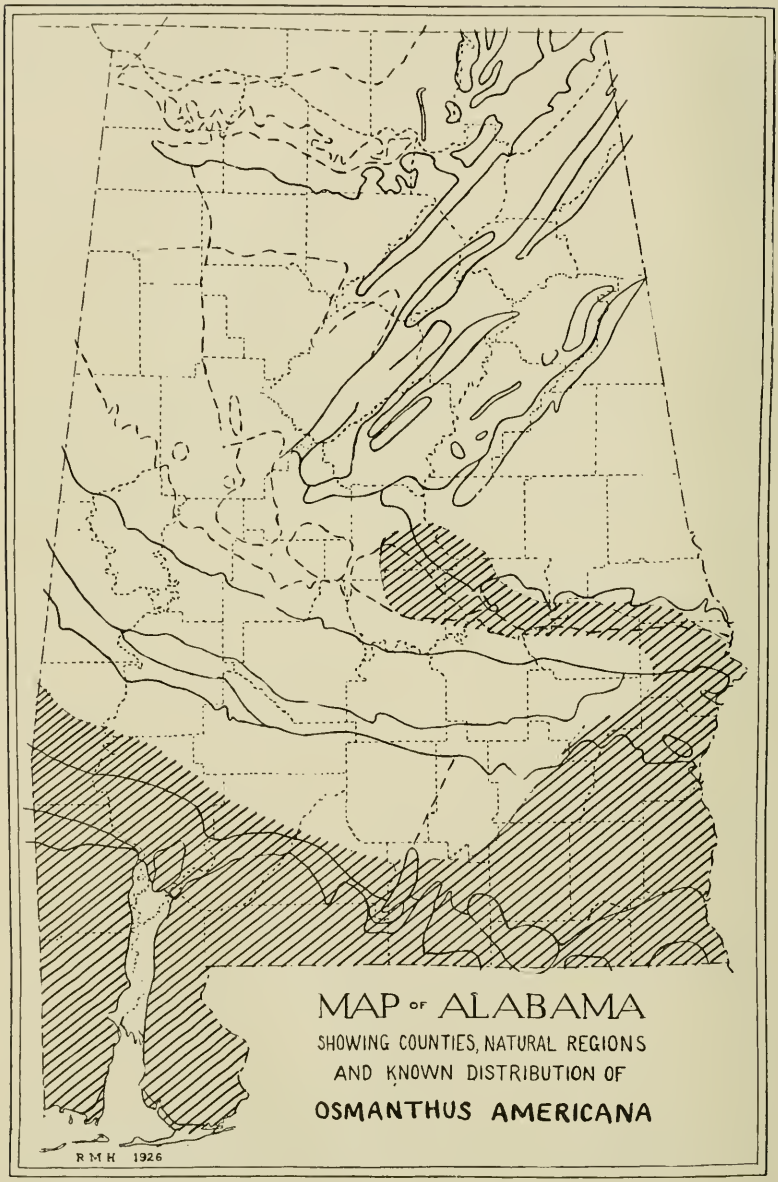
1A. Lauderdale County.
2A. Lawrence, Winston, Cullman and Blount Counties.
2B. Tuscaloosa County.
3. Shelby County.
4. Clay County.
5. Elmore and Chilton Counties.
6C. Greene County.
7. Montgomery County. Dallas County (Cocks).
10W. Sumter and Choctaw Counties.
11. Choctaw County.
12. Geneva County.

OSMANTHUS, Loureiro. (Perhaps has no common name in Alabama.)

Osmanthus Americanus (L.) B. & H. *(Olea Americana*, L.)

(Map 23)

A small evergreen tree, a foot or less in diameter, and rarely more than thirty feet tall, with comparatively few branches, and inconspicuous greenish flowers. Blooms mostly in April, and has fruits something like small olives in the fall. This species is so little known to persons other than botanists that it does not seem



Map 23. Approximate distribution of *Osmanthus Americana.*

to be put to any use, though its wood is heavy, hard, tough and close-grained. It ought to make an ornamental tree, but it does not seem to be handled by the nursery trade.

Inhabits bluffs, hammocks, sandy river-banks, etc., protected from fire, in and near the coastal plain.

5. Chilton County (See Bull. Torrey Bot. Club 33:535. 1906).
6A. Chilton and Elmore Counties.
6B. Autauga County.
8. Pike County.
10E. Crenshaw, Pike, Dale, Coffee and Covington Counties.
10W. Choctaw and Monroe Counties.
11. Clarke and Conecuh Counties.
12. Geneva County.
13. Washington, Mobile, Baldwin and Escambia Counties.
15. Hammock near Orange Beach, Baldwin County.

LOGANIACEAE.

A mainly tropical family, with about 30 genera and 400 species, represented in Alabama by one woody vine and several herbs.

GELSEMIUM, Jussieu.

Gelsemium sempervirens (L.) Ait. f. YELLOW JESSAMINE.

A slender twining vine, with shiny evergreen leaves, and handsome fragrant yellow flowers in spring (about February to April). Very ornamental, but not cultivated as much as it deserves. It belongs to the same family as strychnine, and the whole plant is more or less poisonous (not to the skin, but when taken internally). The flowers should not be kept in a bedroom over night, and even the honey from them is somewhat poisonous. The roots contain an alkaloid known as gelsemine, which is officinal in the U. S. Pharmacopoeia.

Inhabits bluffs, hammocks, ravines, roadsides, and various other places protected from fire, in nearly all parts of the state south of Tennessee Valley and within 1000 feet of sea-level. Not very conspicuous when not in bloom, so that the regions I happen to have visited in February and March figure more largely in my records of its distribution than the others.

2A. Marion, Cullman, DeKalb and Cherokee Counties.
2B. Jefferson and Tuscaloosa Counties.
3. Bibb County.
5. Chilton and Elmore Counties.

6A. Lamar, Pickens, Tuscaloosa, Bibb and Chilton Counties.
6B. Tuscaloosa and Autauga Counties.
6C. Autauga County.
8. Montgomery and Pike Counties.
9. Sumter County.
10E. Barbour, Pike, Dale and Coffee Counties.
10W. Frequent throughout.
11. Clarke and Conecuh Counties.
12. Geneva County.
13. Mobile and Baldwin Counties (Mohr). Escambia and Covington.

One or more species of *Buddleia,* Asiatic shrubs with small purple flowers, commonly cultivated for ornament, occasionally run wild near dwellings, or persist for a few years after the house around which they grew is deserted.

APOCYNACEAE. Dogbane Family.

A rather large family, with about 130 genera and 1,100 species, of herbs, shrubs and trees, mostly tropical. All have milky juice, and some are poisonous. Quite a number are cultivated for ornament.

TRACHELOSPERUM, Lemaire. (No common name.)

Trachelospermum difforme (Walt.) Gray. *(Forsteronia difformis,* A.DC.)

A slender twining vine, woody at the base, something like the yellow jessamine, but smaller and with narrower leaves and much smaller flowers, which appear in June. Economic properties unknown. Probably poisonous, like many of its relatives.

Grows on banks of streams, in second-bottom sloughs, etc., usually in silty soil, and mostly in the coastal plain.

1B. Morgan County.
2A. Along Calvert Prong of Locust Fork of Warrior River, Blount County. (See Bull Torrey Bot. Club, 33-535. 1906.)
2B. Walker County (E. A. Smith). Long Shoal on Locust Fork of Warrior River, Jefferson County.
6A. River bottoms, etc., Tuscaloosa County.
7. Choctaw Bluff on Warrior River, Greene County. Montgomery County (Mohr).
8. Sumter and Marengo Counties.
11. St. Stephens Bluff, Washington County.
13 or 14. Mobile County (Mohr).

VERBENACEAE. Verbena (or Vervain) Family.

About 75 genera and 750 species, mostly tropical herbs, shrubs and small trees. Many are ornamental.

CALLICARPA, Linnaeus. (Only one species in the United States).

Callicarpa Americana, L. French Mulberry. Fox-berry. (Bird-eye. Indian Currant?)

A shrub several feet tall, with rough, coarse deciduous leaves, small pink flowers clustered close to the stem, in June and July, followed by small pink-purple berries. Occasionally cultivated for ornament, and said to be hardy as far north as Washington, D. C. No other use seems to be known for it.

Grows in dry woods, hammocks, etc., avoiding the richest and poorest soils and the higher mountains. It is usually found in places where fire is rare, but fire is not necessarily fatal to it. The slope of a ravine on the University campus where *Callicarpa* is abundant was burned over in June, 1921, and the bushes were killed to the ground, but a few weeks later they were sending up new shoots, which reached full height by the end of the season, but apparently bore no flowers or fruit that year. So probably annual fires would exterminate the plants in a few years, and even a fire every other year might discourage it so that it would soon succumb to the competition of other plants which are less sensitive.

1A. South side of Mussel Shoals, Colbert County.
1B. On limestone slopes, Madison, Marshall, Morgan, Lawrence and Blount Counties.
2A. Cullman County (Mohr).
2B. Tuscaloosa County (Mohr)
3. Talladega, Jefferson, and probably all the other counties.
5. Clay and Lee Counties (Mohr). Chilton and Elmore Counties.
6A. Franklin, Pickens and Tuscaloosa Counties.
6C. Hale, Autauga and Macon Counties.
7. Greene, Sumter, Marengo and Montgomery Counties.
8. Sumter and Marengo Counties.
9. Sumter County.
10E. Pike, Dale, Coffee and Covington Counties.
10W. Wilcox, Clarke, Monroe and Butler Counties.
11. Clarke and Monroe Counties.
12. Washington, Covington and Geneva Counties.
13. Washington, Clarke, Mobile (Mohr), Baldwin and Escambia Counties.
13 or 15. Hammocks on west side of Mobile Bay.

LANTANA, L. The Lantanas.

Lantana Camara, L.

A shrub with roughish leaves and flowers of various colors from pink to orange (and changing to still other colors in fading) in flat long-stalked clusters, in summer. The older flowers around the edges of the cluster are always of a different color from the fresh ones in the middle, giving a sort of rainbow effect. It is native of tropical America, cultivated for ornament as far north as Montgomery, and occasionally runs wild near the coast (as it does much more frequently in Florida). There may be one or two other species that behave similarly.

VITEX, Linnaeus.

Shrubs and trees, mostly tropical.

Vitex Agnus-Castus, L. Lavender. (Chaste-Tree).

A small crooked tree with furrowed bark, palmately compound deciduous leaves, and spikes of small bluish flowers. It is commonly called lavender in Alabama, and it resembles the true lavender *(Lavandula)* in color of flowers and odor of foliage, but that belongs to a different family. It is a native of the Mediterranean region, cultivated for ornament in some of our cities and old rural settlements (e.g., Manningham, Butler Co.), and occasionally escapes to roadsides (Lee County, Earle).

LABIATAE (or NEPETACEAE). Mint Family.

A large family, with about 160 genera and 3,000 species, in temperate and tropical regions. Most of the species are aromatic, and several are used for perfume or medicine. Many are ornamental. The great majority are herbs, but there are a few small shrubs of this family in Alabama and neighboring states.

CLINOPODIUM, Linnaeus (*Satureja*, L.; *Calamintha*, Moench.)

Mostly herbs, but we have two species that are slender shrubs. They do not seem to have any common names in general use.

Clinopodium Georgianum, Harper.* *(C. Carolinianum* of Heller, not of Miller.)

A low shrub with pretty pink flowers in September and October. It could probably be cultivated for ornament, if desired. I have heard it called "rosemary" in Choctaw County, and it does belong to the same family as the true rosemary.

Grows in dry woods that are not often burned. Ranges from the mountains nearly to the coast, but rather rare.

4 Calhoun, Cleburne and Clay Counties.
5. Elmore and Tallapoosa Counties. Lee County (E. A. Smith).
10E. Barbour and Coffee Counties.
11. Choctaw and Monroe Counties.
13. Clarke, Mobile and Escambia Counties.

Clinopodium coccineum (Nutt.) Kuntze. *(Gerardea flammea,* Bartram?†)

A slender sparingly branched shrub two or three feet tall, with small evergreen leaves, and horizontal tubular bright red flowers, blooming all summer and perhaps longer. Very showy, but little known. It has a pleasant odor which might possibly be utilized in perfumery.

Grows in the poorest sandy or rocky soils, unfit for cultivation, where the vegetation is too sparse to carry fire.

13. Near Rockville, Clarke County. "Stony gravelly heights" in what is now the southern part of Monroe County or the northern part of Baldwin (Bartram, August, 1777?). Sandstone rocks in pine woods about five miles west of Bay Minette. Spring Hill (Mohr).
15. Bay shores and old dunes, Baldwin County.

CONRADINA, Gray. (Apparently no common name).

Conradina canescens (T. & G.) Gray. *(Calamintha canescens,* T. & G.)

A low shrub with small narrow grayish evergreen leaves, and pale bluish flowers in fall. Economic properties unknown.

Grows on old dunes and in other very poor dry soils, not far from the coast.

---

*For the reasons for this change of name see Bull. Torrey Bot. Club 33:243-245. 1906.

†Bartram's *Gerardea flammea* has been identified by Mohr (Plant Life, p. 15) and Pennell (Bull. Torrey Bot. Club 40:124, 405. 1913) with *Macranthera fuchsioides,* but that is a tall herb which grows in swamps, and would hardly be in bloom in August.

13. Between Bay Minette and Stockton (Mohr).
15. Navy Cove, Mobile County, and along Perdido Bay (Mohr). Dunes south of Orange Beach, Baldwin County.

SOLANACEAE. Nightshade Family.

A large family in temperate and tropical regions, with over 75 genera and 2,000 species, mostly herbs. Includes several important vegetables, such as the Irish potato, tomato, egg-plant and red pepper, and also some ornamental and poisonous plants and many weeds.

LYCIUM, Linnaeus. (Matrimony Vine, etc.)

Lycium Carolinianum, Walt.

A straggling shrub with blue flowers in June and red berries in October. Little known, but some of its foreign relatives are cultivated for ornament.

Grows in and around salt marshes. Found in both of our coast counties by Dr. Mohr.

SCROPHULARIACEAE. Figwort Family.

A large family of world-wide distribution, with about 180 genera and 3,000 species, mostly herbs. Includes many weeds and ornamental plants, but few that are useful.

PAULOWNIA, Siebold & Zuccarini.

Paulownia tomentosa (Thunb.) Baill. *(P. imperialis,* Sieb. & Zucc.)

(Seems to have no generally recognized common name, but I have heard it called "cottonwood" in Georgia, perhaps on account of the resemblance of its pods to cotton bolls.)

A medium-sized tree much like the *Catalpa* in general appearance, with large opposite fuzzy heart-shaped deciduous leaves, large blue flowers in erect terminal clusters in spring from buds formed the previous fall, and dry pods about an inch long. Native of Japan, where its wood is said to be used for veneers and sandals.

Cultivated for ornament and shade in many parts of the state, and inclined to run wild around cities. I have seen it doing so at Tuscaloosa, and Dr. Mohr reports it from Montgomery and Pike Counties.

BIGNONIACEAE. Trumpet-Creeper Family.

About 100 genera and 600 species, mostly tropical trees and vines, many of them ornamental.

BIGNONIA, Linnaeus.

Bignonia crucigera, L. *(B. capreolata,* L.) Cross-vine.

An evergreen vine, sometimes an inch in diameter, climbing high up into trees by means of tendrils. The stem is divided lengthwise nearly to the middle into four equal segments, separated by a thin layer of what appears to be a part of the bark; and that is what gives the plant its name. Flowers rather large and leathery, dark red with yellow border, in April; fruit a flat pendulous pod, full of winged seeds, much less abundant than the flowers.

Sometimes cultivated for ornament, like some of its more showy tropical relatives. The stems used to be cut into short lengths and smoked by boys, their porosity being the chief adaptation for this purpose.

Grows on bluffs, in bottoms, hammocks, and other places pretty well protected from fire. Common throughout the state except perhaps in regions 4, 14 and 15. It seems to climb *Pinus Taeda* oftener than any other tree, but perhaps only because that is our commonest tree.

TECOMA, Juss. The Trumpet-Creepers.

Tecoma radicans (L.) DC. (Cow-itch.*)

A vine, climbing by means of rootlets, with porous stems sometimes as much as four inches thick, pale shreddy bark, compound deciduous leaves, and large leathery trumpet-shaped red flowers in summer. Often cultivated for ornament, and hardy as far north as New England.

Widely distributed over the state, but more as a weed in fields and along roadsides than as a native. Its principal natural habitats seem to be flatwoods and bottoms. It is rare or absent in some of the regions with poorest soil, such as 2A, 4, 6B, 13 and 15.

*This is a very inappropriate name, but seems to be the usual designation in Georgia at least.

CATALPA, Scopoli.

Catalpa bignonioides, Walt. *(C. Catalpa* (L.) Karst.) Catalpa, or Catawba. (Indian Bean, Cigar Tree.)

A medium-sized rank-scented tree, leaning or crooked, with large alternate heart-shaped deciduous leaves, large clusters of pretty whitish flowers in April and May, and long slender spindle-shaped pods hanging straight down and full of winged seeds.

Often planted for ornament, both north and south. The wood is said to be very durable, but it has little else to recommend it, for it is soft, coarse-grained, and crooked. The bark and seeds as well as the wood are supposed to have some medicinal properties, but they are not officinal. A caterpillar which feeds on the leaves, sometimes in large numbers, is greatly esteemed for fish-bait, and some of the trees may have been planted by the Indians for that purpose.

Grows normally on banks of rivers and creeks, and occasionally in weedy places. Rather scarce in the wild state, and appears somewhat like an introduced tree, though it is not known to grow anywhere but in Alabama and adjoining states, and it seems to be more abundant in Alabama than anywhere else.

1B. Along Paint Rock River, Jackson County.

2A. Sipsey Fork of Warrior River, Winston County (Mohr).

2B. Near mouth af Davis Creek, Tuscaloosa County.

3. Cherokee, Etowah, St. Clair, Talladega and Bibb Counties.

5. On Tallapoosa River in Cleburne and Elmore Counties, and Coosa River in Chilton County.

6A. Warrior River, Tuscaloosa County; Mulberry Creek, Chilton County.

6B. Old fields near Joffre (formerly Kingston sta.), Autauga County.

6C. Near Tallapoosa River, Montgomery County.

7. Dallas County (Cocks). Along Catoma Creek, Montgomery County.

8. Along Conecuh River, Pike County.

10E. Along Conecuh River, Crenshaw and Covington Counties.

10W. Sumter, Monroe, Conecuh and Butler Counties.

11. Choctaw, Washington and Conecuh Counties.

12. Along Pea River, Geneva County.

14. Near Stockton, Baldwin County (Mohr).

RUBIACEAE. Madder Family.

A large family, mostly herbs in temperate regions and woody plants in the tropics. Includes a few species of great economic importance, such as coffee and quinine; also several furnishing other medicines or dyes, and many ornamental plants.

CEPHALANTHUS, Linnaeus.

Cephalanthus occidentalis, L.

Button-Bush. Elbow Bush. Globe-Flower.

A crooked shrub or occasionally tree-like, with opposite or whorled deciduous leaves, and spherical heads of white flowers in summer. Recommended for cultivation in damp grounds. The bark, especially of the root, has some medicinal properties, but it is not officinal.

Grows in ponds and sloughs and on banks of streams, where the soil is moderately fertile and the water fluctuates a few feet with the seasons. Widely scattered over the state. Observed in every region except 4, 6B, and 10E, and there is no imaginable reason why it should not grow in the last-named. It is probably commonest in the Coosa Valley.

CAPRIFOLIACEAE. Honeysuckle Family.

Includes about 11 genera and 350 species, mostly shrubs or vines, chiefly confined to the north temperate zone.

SAMBUCUS, Linnaeus. The Elders.

Sambucus Canadensis, L. (Common) Elder.

A well-known shrub with thick but weak and pithy stems, compound deciduous leaves (which come out very early in the spring), and large flat clusters of small cream-colored flowers in early summer.

Offered for sale by nurserymen for ornamental purposes. The stems are sometimes made into pop-guns, etc., by small boys. The flowers furnish honey, and can also be fried in batter and eaten, with the stem of the flower-cluster for a handle. The berries are not very good raw, but make good preserves and jelly, especially if mixed with other kinds. The bark, flowers and fruit are medicinal, but not officinal.

Grows in damp rich soils; usually a weed, especially along branches and ditches through fields; but probably native in some swamps and alluvial bottoms. Observed in every region except 2A, 4, 12, 14 and 15. Apparently commonest in the Coosa Valley.

VIBURNUM, Linnaeus. ARROW-WOOD, etc.

Viburnum rufidulum, Raf. (*V. ferrugineum* (T. & G.) Small; *V. rufotomentosum* Small. Formerly confused with the northern *V. prunifolium*, from which it differs in having larger and shinier leaves, with rusty petioles.) BLACK HAW.

A small tree, with leaning or crooked trunk usually only a few inches in diameter. Blooms in April, ripens its fruit in fall. Ornamental. The bark, especially of the root, is used in domestic medicine, and would doubtless be officinal but for the fact that this species was only recently separated from its northern relative by the systematists. The fruit is edible, but not particularly desirable.

Inhabits dry woods, bluffs, hammocks, etc., where the soil is moderately rich and fire is rare.

1B. Madison, Morgan (Mohr), Lawrence, Marshall and Blount Counties.
2A. Cullman County; not common.
2B. Walker and Tuscaloosa Counties.
3. Blount, Etowah, Talladega, Jefferson and Bibb Counties.
5. Near Tallassee, Elmore County, and probably in all the other counties.
6A. Lamar County (Mohr).
6C. Autauga County.
7. Dallas County (Cocks). Near House Bluff, Autauga County. Along Catoma Creek, Montgomery County.
10E. Pike and Coffee Counties.
10W. Butler, Wilcox (Buckley) and Choctaw Counties.
11. Clarke County.
15. Hammock near Orange Beach, Baldwin County.

Viburnum acerifolium, L.

A medium-sized shrub, differing from our other *Viburnums* in having three-lobed leaves a little like those of the red maple (whence its name). Blooms in May. Ornamental.

Grows in dry woods, ravines and bluffs, pretty well protected from fire. Not common.

2A. Cullman, Blount and Cherokee Counties.
2B. Walker and Tuscaloosa Counties.
4. Clay County.
5. Clay and Chilton Counties.
6B. Tuscaloosa and Hale Counties.
10W. Clarke County (Mohr). Mountains of Monroe County.
11. Suggsville (Denny).
(15. Reported by Dr. Mohr from Point Clear, Baldwin County, but that seems improbable, and may be a mistake.)

Viburnum bracteatum, Rehder.* (*V. molle*, Mx.?)

A shrub with roundish prominently veined and toothed leaves, blooming in April and May.

Grows in dry or rich woods.

2A. About five miles from Albertville (Harbison).
3. On a limestone hill near Lagarde, Etowah County.

Viburnum semitomentosum (Mx.) Rehder.† (*V. molle* of Mohr and most 19th century writers. *V. scabrellum*, Chapm.)

A tall deciduous shrub with veiny leaves, white flowers in June and bluish berries in fall. Would probably be cultivated for ornament if it was better known.

Grows in hammocks and creek bottoms, in the coastal plain.

6A. Tuscaloosa and Hale Counties.
6C. Hale and Autauga Counties.
8. Pike County.
10E. Barbour, Pike, Dale, Coffee and Covington Counties.
10W. Butler and Wilcox Counties.
11. Choctaw, Clarke and Conecuh Counties.
13. Near Brewton, Escambia County. Mobile County (Mohr).

Viburnum nudum, L. Possum Haw.

A medium-sized shrub with smooth oblong deciduous leaves. Blooms in April and May. Fruit pinkish when immature, finally blue. Might be considered ornamental.

Grows in sandy bogs, branch-swamps, etc., mostly in the coastal plain.

2A. Cullman County (Mohr). Chandler Mountain, St. Clair County.
4. Talladega and Clay Counties.
5. Cleburne, Randolph and Chilton Counties.
6A. Franklin, Marion, Tuscaloosa, Chilton and Elmore Counties.
6B. Tuscaloosa, Chilton and Autauga Counties.
10E. Dale County.
10W. Sumter County.
11. Choctaw County.
12. Washington County.
13. Common throughout.
15. Near Point Clear, Baldwin County.

---

*Described in Trees and Shrubs 1:135, pl. 68. 1903.
†Described in Rhodora 6:59. 1904.

Viburnum nitidum, Ait. *(V. nudum angustifolium,* T. & G.)

Differs from the preceding chiefly in having narrower and paler leaves (see Mohr's Plant Life, p. 744), and approaches the next in some respects. Perhaps not a very distinct species. Habitat similar.

10E. Dale and Coffee Counties.
12. Washington County.
13. Mobile (Mohr) and Baldwin Counties.

Viburnum cassinoides, L. (Withe rod).

A shrub with still narrower leaves than the preceding, and more northerly range. Sometimes cultivated for ornament.

Grows along streams in the mountains.

2A. Pisgah gorge, Jackson County (Harbison). Along Little River on Lookout Mountain, in DeKalb and Cherokee Counties.

A few other species of *Viburnum,* such as *V. Lentago* L., *V. dentatum* L., and *V. obovatum* Walt., have been reported from Alabama or near by, and may turn up in this state some time.

SYMPHORICARPOS, Jussieu.

Symphoricarpos orbiculatus, Moench *(S. vulgaris,* Mx.)

(Coral-Berry. Indian Currant.)

A small shrub with deciduous leaves and clustered purplish berries. Frequently cultivated for ornament.

Native on limestone outcrops, and running wild along roads and railroads in various kinds of soil, in the northern parts of the state.

1A. Lauderdale County.
1B. Jackson (Mohr), Marshall, Morgan, Colbert and Franklin Counties.
1C. Morgan County.
3. Limestone hill near Lagarde, Etowah County.

LONICERA, Linnaeus. The Honeysuckles and Woodbines.

Our species are evergreen vines, but many are shrubs.

Lonicera sempervirens, L.

(Common Woodbine. Trumpet Honeysuckle.)

A twining vine with evergreen leaves and slender red (rarely yellow) flowers, in April. Often cultivated for ornament.

Grows naturally on bluffs and in hammocks, but also frequent in other places protected from fire, such as bushy roadsides. Widely distributed, but not very common.

1B. Limestone slopes of Warnock Mountain, Blount County.
2A. Cullman County (Mohr).
2B. Near Lock 14, Tuscaloosa County.
3. Limestone hill near Lagarde, Etowah County.
4. Coldwater Mountain, Calhoun County.
6C. Perry County.
7. Montgomery County.
10E. Pike and Dale Counties.
10W. Choctaw County.
13. Washington, Mobile, Baldwin and Escambia Counties (Mohr).

Lonicera flava, Sims.

Similar to the preceding, except that its leaves are a little wider and its flowers always yellow. Equally ornamental.

Grows on siliceous rocks among the mountains.

2A. Madison and Marshall Counties (if identified correctly).
4. Calhoun, Talladega and Clay Counties.

Lonicera Japonica, Thunb. *(Nintooa,* Sweet).

JAPANESE HONEYSUCKLE.

A slender many-stemmed vine with hairy evergreen leaves, and fragrant cream-colored (occasionally pinkish) flowers from May to November. Originally cultivated for ornament, but now in disrepute on account of its weedy tendencies. It has escaped to roadsides, railroads and thickets (protected from fire) in all the southeastern states, making a decided nuisance of itself in many places by growing so densely as to choke out other vegetation. (See Andrews 2 and 3, in bibliography.) It is said to be comparatively easy to eradicate, though, when the ground is wanted for any purpose, and it may do some good by checking erosion in gullies and railroad cuts.

It is so widely distributed over the state that it is hardly worth while to give localities for it. It is scarce or absent in the mountains and other thinly settled regions, and in poor soils, and apparently not very common in the black belt, which is near the opposite extreme.

L. longiflora (Sabine) DC., a related species, is said by Dr. Mohr to be escaped from cultivation in Mobile County.

DIERVILLA, Moench.

Diervilla rivularis, Gattinger.

A small deciduous shrub with small yellow flowers in summer, followed by bottle-shaped dry pods. Ornamental, but rare and little known.

Grows on rocky banks of streams in the plateau region (2A). Jackson County (Harbison). Marshall, DeKalb and Cherokee Counties.

D. sessilifolia Buckley, a similar species, chiefly confined to the mountains of North Carolina and Tennessee, has been credited to Alabama without definite locality, but the preceding species may have been mistaken for it. What seems to be this, however, has been pointed out to me along Eight-Mile Creek in Cullman County by W. Wolf (September, 1927).

AMBROSIACEAE. Ragweed Family.

About 8 genera and 75 species, mostly herbs, but includes a few shrubs. United by many authors with the next family.

IVA, Linnaeus. Marsh Elder, etc.

Iva imbricata, Walt.

A weak succulent evergreen shrub, a few feet tall. Economic properties unknown.

Grows on beaches and dunes. Found by Dr. Mohr on West Fowl River, Mobile County.

Iva frutescens, L.

A short-lived weedy-looking shrub, with no known use.

Grows on the edges of brackish and salt marshes, about high tide mark. Mobile and Baldwin Counties (Mohr).

COMPOSITAE (or CARDUACEAE).

Thistle or Sunflower Family.

The largest family of flowering plants, with about 800 genera and at least 10,000 species, of world-wide distribution. The great majority are herbs, but there are a few shrubs and even trees in warm-temperate regions. Several species yield food, medicine, dye, etc., and hundreds are cultivated for ornament. A still greater number are weeds. Our woody ones are chiefly confined to the vicinity of the coast, as in the preceding family.

CHRYSOMA, Nuttall.

Chrysoma pauciflosculosa (Mx.) Greene. (Apparently no common name)

A weak evergreen shrub, two or three feet tall, with pale green leaves, and small yellow flowers in fall. Economic properties unknown.

Grows on old dunes and other dry sterile sandy soils where the vegetation is too sparse to carry fire, near the coast.

15. Dauphin Island, Mobile County (Mohr). Common on top of the bluffs facing Mobile Bay near Daphne, Montrose and Fairhope, also farther south along the bay shore, and on the coast south of Orange Beach, Baldwin County.

BACCHARIS, Linnaeus. (Groundsel Tree, etc.)

Baccharis halimifolia, L.

A tall ragged-looking evergreen shrub, with inconspicuous white flowers in the fall, soon followed by the more conspicuous white pappus. Sometimes cultivated in northern parks.

Its natural habitat is the edges of salt and brackish marshes, but it often grows in damp weedy places farther inland, in Georgia and Florida if not Alabama.

15. Near Magazine and Point Clear.

Baccharis angustifolia, Mx.

Smaller than the preceding, with much narrower leaves.

Grows on edges of salt marshes.

15. Navy Cove, Mobile County (Mohr). Near Oak, Baldwin County.

BORRICHIA, Adanson.

Borrichia frutescens (L.) DC.

A weak almost unbranched shrub or woody herb, about two feet tall, with few but rather large heads of yellow flowers in summer.

15. Salt marshes, Mobile and Baldwin Counties (Mohr).

SUMMARY OF THE CATALOGUE.

The following table indicates the number of genera containing native woody plants, and of native species of large trees, small trees, woody vines and shrubs, in each plant family that is represented by woody plants growing wild in Alabama, 74 families in all as here interpreted. Introduced species are noted in a column at the right, without distinction as to size, but the varieties, hybrids, and species of doubtful occurrence or validity, mentioned incidentally in the foregoing pages, are not counted at all.

The numbers in the table of course cannot be regarded as final in any case, for there will always be differences of opinion as to what constitutes a genus or species, it is impossible to draw a sharp line between tree and shrub (and the same species may be both at different times or places), and additional species may be found in the state almost any day. These numbers represent a conservative estimate, for there is no obvious advantage in claiming as many species as possible, to make it appear that Alabama has more kinds of trees or shrubs than some other states.

	Genera	Native				Introduced
		Large trees	Small trees	Vines	Shrubs	
GYMNOSPERMS						
Coniferae	5	13	--	--	--	-
MONOCOTYLEDONS						
Gramineae	1	--	--	--	2	--
Palmae	3	--	--	--	3	--
Liliaceae	1	--	--	--	2	--
Smilacaceae	1	--	--	6	--	--
APETALAE						
Juglandaceae	2	10	--	--	--	--
Myricaceae	1	--	--	--	3	--
Salicaceae	2	1	2	--	1	1
Corylaceae	3	--	2	--	2	--
Betulaceae	2	1	1	--	1	--
Cupuliferae	3	20	7	--	3	--
Ulmaceae	3	5	2	--	-	--
Moraceae	1	--	1	--	--	3
Platanaceae	1	1	--	--	--	--
Loranthaceae	1	--	--	--	1	--
Santalaceae	1	--	--	--	1	--
Aristolochiaceae	1	--	--	1	--	--
Polygonaceae	2	--	--	1	2	--
POLYPETALAE						
Magnoliaceae	4	4	3	1	1	--
Anonaceae	1	--	--	--	3	--
Ranunculaceae	1	--	--	--	1	--
Calycanthaceae	1	--	--	--	1	--
Lauraceae	3	1	2	--	2	--
Saxifragaceae	4	--	--	1	4	--
Grossulariaceae	1	--	--	--	2	--
Hamamelidaceae	3	1	--	--	2	--
Rosaceae	5	--	--	2	9	2
Pomaceae	4	--	8	--	3	--
Drupaceae	2	1	6	--	1	1
Mimosaceae		--	--	--	--	2
Caesalpiniaceae	2	1	1	--	--	1
Leguminosae	5	--	2	1	5	1
Rutaceae	2	--	1	--	2	--
Simarubaceae	--	--	--	--	--	1
Meliaceae		--	--	--	--	1
Euphorbiaceae	3	--	--	--	3	1
Empetraceae	1	--	--	--	1	--
Anacardiaceae	4	--	2	1	5	--

	Genera	Native				Introduced
		Large trees	Small trees	Vines	Shrubs	
Cyrillaceae	2	..	2	..	..	..
Aquifoliaceae	1	..	4	..	6	..
Celastraceae	2	..	..	1	2	..
Sapindaceae		..	..	..	..	1
Staphyleaceae	1	..	..	..	1	..
Aceraceae	1	5	1	..	..	..
Rhamnaceae	4	..	..	1	5	1
Vitaceae	4	..	..	9	..	..
Tiliaceae	1	?	..	..	..	..
Sterculiaceae	..	..	..	..	..	1
Theaceae	2	1	..	..	2	..
Hypericaceae	2	..	..	..	12	..
Thymeleaceae	1	..	..	..	1	..
Lythraceae	1	..	..	..	1	1
Araliaceae	1	..	..	..	1	..
Cornaceae	2	3	2	..	2	..
GAMOPETALAE						
Clethraceae	1	..	..	..	1	..
Ericaceae	7	..	1	1	13	..
Vacciniaceae	4	..	1	..	9	..
Ebenaceae	1	1	..	..	..	..
Sapotaceae	1	..	2	..	..	..
Symplocaceae	1	..	1	..	..	..
Styracaceae	2	..	2	..	3	..
Oleaceae	4	2	3	..	3	..
Loganiaceae	1	..	..	1	..	1
Apocynaceae	1	..	..	1	..	..
Verbenaceae	1	..	..	..	1	2
Labiatae	2	..	..	..	3	..
Solanaceae	1	..	..	..	1	..
Scrophulariaceae	..	..	..	..	..	1
Bignoniaceae	3	1	..	2	..	..
Rubiaceae	1	..	..	..	1	..
Caprifoliaceae	4	..	1	2	8	1
Ambrosiaceae	1	..	..	..	2	..
Compositae	3	..	..	..	4	..
Total Gymnosperms	5	13	..	..	..	..
Total Monocotyledons	6	..	..	6	7	..
Total Apetalae	23	38	16	2	13	4
Total Polypetalae	72	18	36	17	81	16
Total Gamopetalae	39	4	11	7	49	5
Grand total	145	73	63	32	150	25

It happens that the number of species of trees, large and small, in Alabama is just about the same as in most other southeastern states (except Florida, which has more, on account of the large tropical element in the extreme south), and also Texas and California, which are much larger and more diversified. Of course the number enumerated could be greatly increased by including the multitude of doubtfully distinct forms of *Crataegus*, *Tilia*, etc., but the same could be done also in other states, and the relative numbers would still be about the same. Incidentally we have considerably more species of trees than the whole of Europe. Data on numbers of species of shrubs and vines in other states and countries are not readily available, but they are probably approximately proportional to the trees, in climates like ours.

The family represented by the most genera of woody plants is Ericaceae, with 7. Large trees are most numerous in the Cupuliferae (mostly oaks), small trees (not counting *Crataegus*) likewise, vines in the Vitaceae (unless we should split the species of *Smilax* more minutely), and shrubs in the Ericaceae. It is interesting, and perhaps of some evolutionary significance, that all our Gymnosperms are large trees, about half the large trees are in the group Apetalae, and most of the small trees, vines and shrubs in the Polypetalae. The Gamopetalae have comparatively few woody plants in proportion to the total number of species in that group.

It is a curious fact that in some families which consist mostly of herbs, such as Polygonaceae, Labiatae, Solanaceae, Ambrosiaceae and Compositae, our shrubby representatives are chiefly confined to the vicinity of the coast. It happens that these all have simple leaves; while in two other mainly herbaceous families, the Ranunculaceae and Araliaceae, our single woody representatives have compound leaves and show no partiality to the coast.

DISTRIBUTIONAL NOTES

It will be of interest to plant geographers and perhaps others to group the species of woody plants together according to certain similarities of distribution within the state. In this study two extreme types hardly need to be considered: first, species so widely distributed over the state that one would have to seek elsewhere for their limiting factors, and last, those which are so rare here that it is not safe to draw conclusions from the available records.

In each of the following lists trees and shrubs will be combined, and arranged in the same order as in the catalogue. Where we have only one species, or all the Alabama species of a genus belong in the same category, the generic name only is given. The names of evergreens are printed in heavy type, to facilitate certain important generalizations. Where a name is followed by (x) it means that the species extends farther in the direction indicated (north or south or inland or coastward, as the case may be) in some near-by state, so that its limit in this state is probably not determined by climate or altitude. Of course it is not usually possible to mark the limits of a species by a sharp line, for most species thin out gradually away from their centers of distribution, and after one has apparently gotten entirely out of the range of a given species a few scattered individuals may turn up farther on. (This is especially true of those whose distribution has been modified by civilization.) So the following generalizations cannot be considered as final.

First we may consider the southern or coastward or lower altitudinal limits of species whose main distribution is farther north.

The following seem to be chiefly confined to higher altitudes, say above 1000 feet (and therefore to the northern half of the state).

Tsuga Canadensis
Betula lenta
Ribes curvatum
Ribes Cynosbati
Prunus Alabamensis
Stewartia pentagyna
Azalea arborescens

Rhododendron Catawbiense
Viburnum cassinoides
Lonicera flava
Diervilla

The ranges of the following seem to terminate somewhere between the mountains and the fall line (inland edge of the coastal plain).

Juglans cinerea
Corylus
Ulmus serotina
Hydrangea cinerea
Neviusia
Rubus occidentalis
Robinia Pseudacacia
Schmaltzia aromatica
Acer Saccharum
Polycodium melanocarpum
Symphoricarpos

The following two trees which are common in the hill country extend a little south of the fall line in places, but apparently not as far as the black belt.

Pinus Virginiana
Quercus montana

The following reach the black belt or blue marl region, and apparently no farther south in Alabama (though they are found along or near the Chattahoochee River in Florida or pretty close to it).

Salix humilis (x)
Ulmus fulva (x)
Hypericum aureum (x)

The following seem to stop in the southern red hills or in the adjacent lime hills, though more thorough exploration may remove some of them from this category. (All are deciduous.)

Juglans nigra (x)
Hicoria ovata
Castanea dentata
Quercus Durandii
Quercus pagodaefolia
Quercus velutina (x)

Quercus borealis maxima
Quercus coccinea
Ulmus Americana
Aristolochia tomentosa
Magnolia acuminata
Magnolia tripetala
Xanthorrhiza
Benzoin aestivale (x)
Philadelphus
Hydrangea arborescens (x)
Malus angustifolia (x)
Crataegus spathulata
Prunus Americana (x)
Ptelea (x)
Rhus glabra (x)
Acer leucoderme
Acer Negundo (x)
Aesculus parviflora
Dirca (x)
Cornus alternifolia
Polycodium stamineum
Vaccinium vacillans
Halesia Carolina (x)
Fraxinus Americana (x)
Viburnum acerifolium

The following seem to get into the pine-barren regions (12 and 13) only along the larger streams which rise farther inland. Those marked (x) occur also in Florida, chiefly in calcareous soils, and their southern limits are probably determined by soil rather than climate.

Pinus echinata (x)
Arundinaria macrosperma
Fagus (x)
Ostrya (x)
Populus deltoides
Quercus lyrata (x)
Quercus Phellos (x)
Ulmus alata
Morus rubra (x)

Platanus
Brunnichia
Magnolia pyramidata (x)
Magnolia macrophylla (x)
Hydrangea quercifolia (x)
Crataegus viridis (x)
Crataegus apiifolia (x)
Cercis (x)
Amorpha fruticosa
Ilex decidua
Aesculus Pavia (x)
Berchemia (x)
Ampelopsis cordata
Aralia spinosa (x)
Cornus stricta (x)
Nyssa uniflora (x)
Kalmia latifolia
Adelia acuminata (x)
Adelia ligustrina (x)
Catalpa

The next few lists deal with northern or inland limits. The first is of species which in Alabama are known only in or near the coast strip. Most of them are evidently thus restricted on account of the peculiar soil conditions existing there (salt water or sterile soil), rather than climate, for several of them extend far up the Atlantic coast, and a few some distance into the interior of Georgia.

Pinus clausa
Smilax auriculata (x)
Polygonella polygama
Sageretia (x)
Lycium (x)
Ceratiola (x)
Conradina
Iva imbricata (x)
Iva frutescens (x)
Chrysoma (x)
Baccharis (x)
Borrichia (x)

The following seem to be confined to the pine-barren regions, or nearly so, as far as Alabama is concerned, though some extend northward in the coastal plain to North Carolina, and the first one (besides many herbs of similar distribution) reaches New England.

Chamaecyparis (x)
Serenoa
Myrica inodora
Quercus geminata
Quercus minima
Chrysobalanus
Stillingia aquatica (x)
Cliftonia
Ilex Cassine
Ilex myrtifolia
Ceanothus microphyllus
Gordonia
Hypericum myrtifolium
Hypericum aspalathoides
Hypericum opacum
Kalmia hirsuta
Pieris phillyreifolia
Gaylussacia hirtella
Styrax pulverulenta

Most of these are evergreen bog plants, and the most important factors for them are probably sour soil and copious summer rainfall.

The following seem to have their inland limits in the southern red hills (region 10, especially the eastern division), though some are not found very far from the pine-barrens.

Pinus Elliottii
Taxodium ascendens
Asimina angustifolia
Hypericum fasciculatum
Leucothoe axillaris
Leucothoe racemosa (x)
Viburnum nitidum

At this point might be mentioned two shrubs (one of them occasionally arborescent) whose chief distribution in Alabama is in the southern red hills, though they have been seen once or twice in the hill country north of the fall line, and they both range northward to Canada; namely, *Dirca palustris* and *Cornus alternifolia*. Just why they should prefer the southern to the northern part of the state is an unsolved problem, unless there are some unsuspected differences between the northern and southern forms. (Compare *Magnolia Fraseri* and *M. pyramidata*.)

Almost the only woody plants that seem to have their inland limits in the black belt are *Persea Borbonia* and *Bumelia lanuginosa*. *Pinus glabra* and *Magnolia grandiflora* extend just a little farther inland, to the Eutaw belt, and the following seem to have their inland limits in the more typical portions of the central pine belt (6A or 6B).

Pinus serotina
Smilax Walteri
Myrica cerifera
Quercus Margaretta
Crataegus Michauxii
Ilex vomitoria
Ilex coriacea
Ilex glabra (x)
Gaylussacia frondosa
Viburnum semitomentosum

Some of these may be limited by temperature, and others by the scarcity of sand or swamps farther inland.

In Alabama a large number of species that are very characteristic of the coastal plain, and apparently confined to it in most other states, are found occasionally a few miles, say ten to fifty, above the fall line, in soils evidently residual from the older rocks, and having no connection with the coastal plain. The reason for this is not at present obvious, but there may be some unknown factors of geological history involved. Among the woody plants which seem to belong to this category are the following:

Taxodium distichum
Sabal glabra
Smilax lanceolata
Quercus Catesbaei

Quercus cinerea
Quercus laurifolia
Planera
Brunnichia
Magnolia pyramidata
Illicium
Prunus Caroliniana
Wisteria
Sebastiana
Cyrilla
Acer Floridanum
Pieris nitida
Vaccinium Myrsinites
Halesia diptera
Fraxinus Caroliniana
Osmanthus

More extreme cases of the same tendency are *Pinus palustris,* which ascends to nearly 2,000 feet on the Blue Ridge, *Hicoria aquatica* and *Quercus lyrata,* in Morgan County, *Persea pubescens,* which grows in wet ravines on the slopes of the Blue Ridge, *Berchemia* and *Ampelopsis arborea,* in the Tennessee Valley, *Nyssa biflora,* in a few places in the plateau region, *Nyssa uniflora,* common in some parts of the Tennessee Valley, *Clethra alnifolia,* along streams on the Blue Ridge and on dry hills in northeastern Chilton County (and ranging northward to New England), *Styrax grandifolia,* in Cullman County, and *Adelia acuminata,* on the Tennessee River in Morgan County. There are also a few species which in the states of the Atlantic slope are confined to the coastal plain, or nearly so, but in Alabama are known from so many upland stations as to be hardly worth special mention here, such as *Myrica Carolinensis, Quercus Michauxii, Magnolia glauca, Ascyrum stans,* and *Trachelospermum.*

The following extend up about to the foot of the Blue Ridge or other non-calcareous mountains, but not higher, perhaps in most cases merely on account of the poor or rocky soil or the absence of muddy streams.

Arundinaria macrosperma
Juglans nigra (x)
Hicoria ovata (x)

Salix nigra
Populus deltoides
Carpinus
Betula nigra
Quercus alba (x)
Quercus Michauxii
Quercus falcata
Quercus nigra
Quercus Phellos
Ulmus Americana
Ulmus alata
Celtis
Morus rubra
Phoradendron
Magnolia acuminata (x)
Magnolia tripetala
Magnolia macrophylla
Itea
Liquidambar
Platanus
Crataegus viridis
Crataegus spathulata
Prunus Americana
Cercis (x)
Amorpha fruticosa
Staphylea
Acer leucoderme
Acer Negundo
Aesculus Pavia
Aesculus parviflora
Rhamnus Caroliniana
Berchemia
Vitis rotundifolia
Gelsemium
Callicarpa
Clinopodium Georgianum
Bignonia
Tecoma

Cephalanthus
Sambucus

The following occur in the plateau region (2A), and most of them also farther north or south, but they are rare or absent in the Tennessee Valley, which although farther north is lower and presumably warmer, in summer at least. Those which extend into the state of Tennessee or beyond are indicated by the same sign as before, and their absence from the valley may be due in most cases to the fact that they do not thrive in rich soil.

Pinus palustris
Tsuga (x)
Smilax laurifolia
Myrica Carolinensis
Betula lenta (x)
Castanea pumila (x)
Nestronia
Magnolia (several species)
Asimina parviflora
Xanthorrhiza (x)
Calycanthus
Aronia
Toxicodendron pinnatum (x)
Toxicodendron quercifolium
Aesculus parviflora
Vitis rotundifolia
Stewartia (both species)
Ascyrum stans
Aralia spinosa (x)
Nyssa biflora
Azalea arborescens (x)
Rhododendron Catawbiense
Cholisma ligustrina (x)
Gaylussacia dumosa
Vaccinium virgatum
Vaccinium vacillans (x)
Vaccinium corymbosum (x)
Styrax Americana
Chionanthus
Gelsemium

Viburnum acerifolium (x)
Viburnum cassinoides (x)
Lonicera sempervirens
Lonicera flava
Diervilla

For somewhat similar reasons the following species which are known on both sides of the black belt are seldom or never seen in that region unless in sandy spots which are not typical. The considerable proportion of evergreens among them indicates a partiality to poor soils.

Pinus serotina
Smilax laurifolia
Smilax Walteri
Myrica Carolinensis
Salix humilis
Castanea dentata
Castanea pumila
Quercus coccinea
Magnolia acuminata
Magnolia tripetala
Magnolia macrophylla
Illicium
Xanthorrhiza
Calycanthus
Persea pubescens
Hydrangea quercifolia
Aronia
Crataegus uniflora
Toxicodendron pinnatum
Cyrilla
Ilex coriacea
Ilex glabra
Acer leucoderme
Ascyrum stans
Ascyrum hypericoides
Decodon
Clethra
Azalea nudiflora
Azalea viscosa

Kalmia latifolia
Pieris nitida
Cholisma ligustrina
Oxydendrum
Gaylussacia dumosa
Gaylussacia frondosa
Polycodium stamineum
Vaccinium Myrsinites
Vaccinium virgatum
Vaccinium corymbosum
Symplocos
Styrax grandiflora
Styrax Americana
Osmanthus
Clinopodium Georgianum
Viburnum acerifolium
Viburnum semitomentosum
Viburnum nudum

Lastly may be considered those species which seem to be more abundant in Alabama than in all the rest of the world. Probably no other eastern state, except Florida and possibly North Carolina, has so many woody plants of which this can be said. Two very distinct shrubs, *Nevinsia Alabamensis* and *Croton Alabamensis,* are not known in any other state, though the former has been seen within a few miles of Tennessee, and there is an unverified report of its occurrence in Missouri. Quite a number of alleged species of *Crataegus* and a few of *Prunus* and *Tilia* are known only from Alabama specimens, but so few people are able to distinguish them that it is hardly safe to assert that they are endemic.

The following shrubs and small trees are known in one or more adjoining states, but seem to have their headquarters, so to speak, in Alabama. *Magnolia macrophylla, Illicium Floridanum, Hydrangea quercifolia, Schmaltzia aromatica, Hypericum aureum, Aesculus Pavia,* and *Aesculus parviflora.** Most of these are very

*Two of these were discovered by William Bartram, the first botanical explorer in what is now Alabama, and most of the others are mentioned in his book of Travels. All of them, as well as the *Nevinsia* and *Croton,* are found in Tuscaloosa County.

showy, and capable of cultivation, and almost any of them would be far more appropriate for a state flower than any of the species hitherto suggested for that distinction. Photographs of most of them and distribution maps of three of them are reproduced in this work.

The following are probably more abundant in Alabama than in any other equal area, though this state may not contain a majority of their specimens: *Hicoria myristicaeformis, Quercus Durandii, Ulmus serotina, Magnolia pyramidata, Cotinus, Acer leucoderme, Berchemia, Nyssa uniflora, Styrax grandifolia, Catalpa,* and *Viburnum semitomentosum.* More thorough explorations and quantitative studies in this and adjoining states might reveal many additional examples.

ADDITIONS AND CORRECTIONS.

Page 38. Another reason for the scarcity of cotton in the extreme southern part of the state is that the copious late summer rains (see Map 5, page 37) interfere with picking.

Page 73, line 20. For line read lime.

Page 83. The leaves of *Yucca filamentosa* are very tough, and are often used in the rural districts for suspending meat or fish.

Page 213. The statement about the ash of *Prunus* being poor in silica is based on a paper by W. D. Richardson in Science (II. 51:546-551) for May 28, 1920, in which it is stated that the ash of twigs of *Prunus pumila*, a shrub growing on the dunes of Lake Michigan in Indiana, contains only 1.50% of silica (as compared with 12.12 to over 60% in various other plants in the same habitat). (The author neglected to state at what season the material was collected, or the ratio of ash to the total weight of the plant.)

In order to see whether this was characteristic of other species of *Prunus*, even as distantly related as the subgenus *Padus*, the writer collected some leaves of *Prunus serotina*, growing in red loamy soil in Tuscaloosa, early in August, 1928, and had them burned and the ash analyzed at the University. The ash constituted 6.73% of the dry weight of the leaves, and only 4.22% of it was insoluble in hot hydrochloric acid. This represents approximately the amount of silica at this season. But it should be borne in mind that the silica content of leaves generally increases markedly as the season advances, and that it is greater in leaves than in wood of the same tree.

Page 286. Mr. Ashe's proposal to substitute *Tsutsusi* for *Azalea* was published in a footnote in an article entitled "Suggestion for a National Arboretum," in the Journal of Forestry for May, 1921 (Vol. 19, but page number not given in the reprint).

A critical reader may notice some lack of uniformity in the styles of type used for names of genera and species, and in the references to literature and the abbreviations of authors' names; most of which may be ascribed to the length of time required to write and print a work of this size and the writer's preoccupation with other things while this was nearing completion. But these inconsistencies do not affect the accuracy of the treatment, and they are seldom noticeable on any one page.

INDEX

This index includes technical and common names of plants, economic properties and uses, names of persons, and some miscellaneous topics, but not counties, rivers, etc. (for those are mentioned too often), or trivial matters which no one would look for. Technical names of families are printed in small capitals, and those of genera and species (including synonyms) in italics, while common names of plants are enclosed in quotations, to make it easier to distinguish them from other common nouns.

As some plants are mentioned in some places by technical names only, and in others by common names only, any one who wishes to find everything that is said about a given species should bear both names in mind. Where there is only one Alabama species in a genus, or the species of the genus are few enough to be all discussed on two or three consecutive pages, usually the generic name only is given in the index, so as to economize space. Varieties are not indexed at all.

Where there are several different species in a genus, whose common names consist of the same noun with different adjectives, such as red oak and white oak, one should look for them in the index under the first word, not the second.

Numbers in parentheses indicate pages where the topic in question is mentioned indirectly, or under a different name. For example, under fodder and forage the pages in parentheses refer to plants eaten by animals, without using those particular words.

The entries in the index may be classified roughly as follows: Technical names of families (including synonyms) 83, common names of families 60, technical names of genera and species (including synonyms) 480, common names of same 325, names of persons (who have worked in Alabama or written about some of the plants discussed) 150 (including four women), economic properties (including uses, products, diseases relieved by certain plants, etc.) 285, and miscellaneous topics 95.

A

Acacia family, 217
ACERACEAE, 251-255, 326
Acer barbatum, 252
" *Carolinianum*, 254
" *Drummondii*, 254
" *Floridanum*, 252, 334
" *leucoderme* 14, 157, 252-253, 330, 335, 337, 339
" *Negundo*, 254-255, 330, 335
" *rubrum*, 156, 157, 254
" *Rugelii*, 252
" *saccharinum*, 154 156, 157, 251, 253
" *Saccharum*, 251-252, 329
Adelia, 157, 306, 334
AESCULACEAE, 255-258, 326
Aesculus austrina, 257
" *discolor*, 257
" *Georgiana*, 257
" *glabra*, 255
" *macrostachya*, 257
" *octandra*, 256
" *parviflora*, 257-258, 330, 335, 336, 338
" *Pavia*, 256, 331, 335, 338
Agricultural implements, 304 (see also hoe, pitchfork, etc.)
Ailanthus, 226, 227
Albizzia, 217
"Alder", 28, 106
Alkaloids, 309 (317)
Alnus, 27, 106-107
Alnus, 27, 106-107
Alumina in soil, 53
AMBROSIACEAE, 322, 326, 327
Amelanchier, 202
"American elm", 143
Amorpha, 221-222, 331, 335
Ampelopsis, 264-265, 331, 334
AMYGDALACEAE, 212
ANACARDIACEAE, 176-178, 325
Andrews, Miss E. F., 13, 45, 321
Andromeda, 293 (see also *Cholisma*, *Pieris*)
"Angelica", 275
ANONACEAE, 176-178, 325
Anthodendron, 285
Anti-periodics, 307
Antipyritics, 101
APOCYNACEAE, 310, 326
Apple family, 200

AQUIFOLIACEAE, 243-249, 326
Aralia, 275-276, 331, 336
ARALIACEAE, 275-276, 326, 327
ARECACEAE, 78
Aristolochia, 158, 330
ARISTOLOCHIACEAE, 158, 325
Arizona, 227
Arkansas, 237
Armillaria, 109
Arnold Arboretum, 15, 20, 22, 131, 191, 205, 211
Aromatic plants, 39, 97, 166, 173, 176, 180-183, 225, 275, 312
Aronia, 201, 336, 337
Arrows, 88, 293
"Arrow-wood", 317
Artificial limbs, 255
Arundinaria gigantea, 73
" *macrosperma*, 19, 73-76, 330, 334
" *tecta*, 76-77
Ascyrum, 270, 334, 336, 337
"Ash", 21, 304-306
Ashe, W. W., 13, 15, 20, 50, 109, 116, 134, 172, 205, 214, 215, 267, 268, 285, 302, 339
Asimina, 177-178, 336
Astringents, 106, 113, 185, 237, 238, 299
Avocado, 180
Azalea, 22, 285-288
" *arborescens*, 286, 328, 336
" *canescens*, 286, 287
" *lutea*, 288
" *nudiflora*, 277, 287-288, 337
" *prunifolia*, 288
" *serrulata*, 286
" *viscosa*, 286, 337

B

Baccharis, 323, 331
Bacteria, 61, 154, 216
Bailey, L. H., 13
Baker, C. F., 157, 177, 210, 241, 248, 263, 279, 298, 302
Ball, T. H., 73
Balsam, 20
Bamboos, 72, 73
"Bamboo vine", 85
Barksdale, J., 269
Barrels, 41, 63, 112 (See also Cooperage, Staves)
Bartram, Wm., 67, 73, 100, 173, 216, 257, 269, 278, 313, 338
"Bartram oak", 131
"Basket oak", 118
Baskets, 41, 76, 78, 100, 112, 118, 162, 166, 172, 266, 280, 282
"Basswood", 14, 266
"Bastard pine", 58
Bates, F. A., 13
Bats (baseball), 304
"Bay", 25, 27 (See also Red, Sweet, White)
"Bayberries", Bayberry family, 97-100
"Bay poplar", 282
Bay rum, 180
Beadle, C. D., 13-14, 203-207
Beads, 227
Beams, 41, 112
"Bear-grass", 83
Bedding, 41
"Beech", 18, 54, 107
Bee-gums or hives, 172, 279
Beetles, bark, 18
Benzoin, 183-184, 330
Berchemia, 259-260, 331, 334, 335, 339
Berckmans, P. J., 172
Berney, Saffold, 19
Berry, E. W., 55
Betts, H. S., 14, 43, 50, 52
Betula lenta, 106, 328, 336
" *nigra*, 105-106, 335
BETULACEAE, 105-107, 325
Beverages, 182, 183, 268
Bigonia, 315, 335
BIGNONIACEAE, 315-316, 326
Bilmore Herbarium, (13, 14, 16), 203, 206
"Birch", 18, 105-106
Birch family, 105
"Bird-eye", 311
Birds, 69, 150, 162, 183, 209, 215, 216, 227, 246
Bitter bark, 226, 276
"Bittersweet", false, 250
"Black alder", 248
"Blackberries", 197-198
"Black birch", 106
"Black cypress", 61, 65
Black drink, 246
"Black gum", 25, 279, 280
"Blackjack oak", 126, 129
"Black locust", 223
"Black oak", 124
"Black pine", 51
"Black sumac", 237
"Black walnut", 14, (22), 87, 145
"Black willow", 101
"Bladdernut", 251
Blinds, 41, 63

Blood medicine 106
"Blue ash" 305
"Blueberreies", 297
"Blue-jack" (oak), 133
Boats, 62, 67, 68 (See also Canoes, Ships)
Bobbins, 107
"Bois d'arc", 151
Book-cases, 112
Boot and shoe findings, 299
Borders, plants used for, 104, 178, 249
Borrichia, 323, 331
Borya, 306
Bowls, 282
Bows, 88
"Box elder", 254
Boxes, wood used for, 48, 101, 102, 107, 143, 148, 171, 172, 193, 253 255, 266, 282
Boynton, C. L., 14, 146, 192
" F. E., 222
Bradleia, 222
Bray, W. L., 154
Bread-boards, 266
"Bridal wreath", 194
Bridges, bridge timbers, 39, 112
"Brier-berry", 197
Britton, N. L., 203, 204
Broom-handles, 166, 253
Brooms, 182, 249
Broussonetia, 151, (156), 226, 227
Brown, Addison, 203, 204
" H. B., 208
Brunnichia, 159, 331, 334
Brush, W. D., 14, 87, 153, 266
Brushes, 79
Brush handles, 107, 244
Buckets, 62, 67, 68
"Buckeyes", 255-258
Buckley, S. B., 9, 14, 115, 184, 199, 209, 234, 247, 259, 301, 318
Buckthorn family, 258
Buckwheat family, 158
Buddleia, 310
Buggy shafts, 88
Building materials, 78 (See also Interior finish, Shingles, etc.)
"Bullace", 263
Bumelia, 300, 301, 333
Bunker, P. S., 3, (89), 225
Bush, B. F., 14, 266, 267
Butchers' blocks, 153
Butneria, 179
Buttercup family, 178
"Butternut", 88
"Button-bush", 317
"Buttonwood", 153

C

Cabell, P. H., 14
Cabinet-making, cabinet work, 87, 151, 193, 215, 244, 254, 268
CAESALPINIACEAE, 217-220, 325
Caffeine, 20, 246
Calamintha, 312, 313
Caldwell, G. W., 14, 86
"Calico bush", 289
California, 161, 227, 327
CALYCANTHACEAE, 179-180, 325
Calycanthus, 179-180, 336, 337
Camellia family, 268
Camphor, 180
Canada, 205, 274, 278, 333
"Canada plum", 213
Canby, W. M., 273
Candles (bayberry), 97, 100
"Cane", cane-brakes, 73, 75
Canker, chestnut, 110
Canoes, 105, 182
CAPRIFOLIACEAE, 317-322, 326
CARDUACEAE, 322
Carlomohria, 303
Carpinus, 104, 335
"Carolina poplar", 103
Carriages, 172, 304
Cars (railroad), 41
Carving, wood, 244
Car-window observations, 10, 269, 283
Cary, C. A., 14
Carya, 90-92
Caspari, C. E., 16
"Cassena", 244, 246
Castanea dentata, 108-110, 329, 337
" *pumila*, 111, 336, 337
Catalpa, 314, 316, 331, 339
Catarrh, 192
"Catawba", 316
Caterpillars, 316
Cathartics, 88
Cattle, (86), 179, 215, (218), 240, 244, 256, 257, 289, 291
Ceanothus, 260-261, 332
"Cedars", 16, 67, 68
CELASTRACEAE, 249-250, 326
Celastrus, 250
Celtis, 148-150, 335
Cephalanthus, 317, 335
Ceratiola, 231
Cercis, 217-218, 331, 336
Cerothamnus, 97
Chairs, 107
Chamaecyparis, 67, 332

"Chaneyberry", 227
Chapman, A. W., 30, 109, 203, 289
Charcoal, 42, 43, 67, 101, 106, 116, 166 254
"Chaste-tree", 312
"Cherokee rose", 199
"Cherries", 212, 214, 216
"Cherry birch", 106
Chesnut, V. K., 15, 20, 246
Chess-men, 244
"Chestnut", 13, 108-110
Chestnut blight or canker, 110
"Chestnut oaks", 116-119
"Chestnut white oak" 118
Chewing gum, 192
"Chickasaw plum", 214
Chimneys (stick), 41
China, 152, 199, 231
"Chinaberry", 227, 250
"China tree", 227
"Chinese tallow tree", 231
"Chinese varnish tree", 268
"Chinquapin", 111
"Chinquapin oak", 118
Chionanthus, 307, 336
Chittenden, A. K., 15, 193
"Chittimwood", 232
Chocolate, 268
"Choke-berry", 201
"Choke-cherries", 212
Cholisma, 293, 336, 338
Christmas trees, 60
Chrysobalanus, 212, 332
Chrysoma, 323, 331
Churns, 62, 68
Cigar boxes, 282
"Cigar tree", 316
Cinnamon, 180
"Circassian walnut", 382
Cissus, 264
Citrous fruits, 225
Cladrastis, 220-221
Clanton, S. W., 15
Clethra, 285, 334, 337
CLETHRACEAE, 285, 326
"Cliff pine", 58
Cliftonia, 242-243, 332
Clinopodium, 312-313, 335, 338
Clothes-chests, 68
Clothespins, 107
Cocks, R. S., 15, 88, 91, 94, 103, 110, 116, 118, 140, 148, 167 169, 180, 201, 202, 213, 214, 226, 239, 241, 247, 253, 256, 267, 268 279, 300, 302, 304, 305, 307 ,316, 318
Coffee, 317
Cogs (wooden), 104
Collins, J. F., 110
Columns, 39, 161, 171, 282
Commission of Forestry (Ala.), co-operation with, 3
COMPOSITAE, 322-323
CONIFERAE, 39-72, 325
Conradina, 313-314, 331
Cooper, R. E., 22, 43
Cooperage, (41), 112, 143, 193 (see also Barrels, Staves)
"Coral-berry", 320
Cork, 107,, 230
CORNACEAE, 276-284, 326
Cornus alternifolia, 278, 330, 333
" *Amonum*, 278, 279
" *asperifolia*, 279
" *florida*, 157, 276-278
" *stricta*, 278-279, 331
CORYLACEAE, 104-105, 325
Corylus, 104-105, 329
Corypha, 79
Cotinus, (14, 19), 232-237, 339
Cotton baskets, 112
Cotton gins, 41, 115, 172, 280, 304
Cotton presses, 112
"Cottonwood", 22, 102, 303, 314
Cough medicine, 215
Coulter, J. M., 203
"Cow-itch", 315
"Cow oak", 118
Crataegus, 13, 14, 25, 202-211, 327, 338
" *aestivalis*, 211
" *apiifolia*, 210, 331
" *arborescens*, 209
" *armentalis*, 211
" *Crus-Galli*, 210
" *Marshallii*, 210
" *Michauxii*, 210-211, 333
" *Mohri*, 210
" *rufula*, 211
" *spathulata*, 209-210, 330, 335
" *uniflora*, 211, 337
" *viridis*, 209 331' 335
Crates, 48, 54, 101, 105, 162, 172, 256, 266, 282
Creosote, 41, 43, 48
"Crepe myrtle", 275
Cribs, 41
Cross-ties, 41, 48, 62, 66-68, 87, 108, 112, 113, 116, 172-173, 223, 280
"Cross-vine", 315
Croton, 19, 228-230, 338

Crowberry family, 231
Crowfoot family, 178
"Cucumber trees", 167-171
Cuno, John B., 15, 276, 299
CUPULIFERAE, 107-142, 325, 327
"Currants", 190
Custard-apple family, 176
Cynoxylon, 276
"Cypress", 16, 18, 24, 25, 61-67, 292
Cyrilla, 38, 241-242, 334, 337
CYRILLACEAE, 241-243, 326

D

"Dahoon holly", 244
Dams, destruction of vegetation by, (43), 63, 78, 220, 250, 252, 253, 264, 272, 283, 289, 305
Darbya 157
Daubentonia, 18, 28, 223
Decodon, 274, 337
Decorations, decorative plants, 14, 41, 78, 81, 83, 85, 86, 154, 162, 192 243, 244, 246, (250, 276), 287, 291, 295
Decumaria, 188, 190
"Deer-berry", 295
"Deer plum", 212
Delaware, 21
Denny, Andrew, 9, 10, 15, 85, 158, 167, 302, 304, 318
"Dewberries", 197-198
Diaphoretics, 173
Diarrhoea, 106
Diervilla, 322, 329, 337
Diospyros, 157, 299-300
Dirca, 274, 278, 330, 333
Diseases of trees, 109, 111, 253
Distillation of wood, 43
Divining rods, 191
"Dogwood", 15, 27, 276-278, 287
"Dollar leaf oak", 129
Doors, 41, 63
DRACAENACEAE, 82
DRUPACEAE, 212-216, 325
Dunes, 60, (83), 84, 137, 159, 231, 263, 313, 322, 323 339
Durable wood 39, 62, 87, 104, 108, 112, 113, 151, 152, 182, 223, 232, 316
"Dutchman's pipe", 158
"Dwarf live oak", 121
"Dwarf palmetto", 78
"Dwarf willow", 102
Dyes, 22, 87, 88, 106, 107, 124, 133, 151, 179, 220, 232, 237, 239, 254, 260, 274, 299, 301, 305, 317, 322
Dysentery, 113

E

Earle, F. S., 9, 10, 15, 82, 157, 176, 177, 184, 194, 198, 210 226, 241, 248, 263, 279, 286, 289, 293, 298, 302, 312
Earthworms, 69, 108, 109, 116, 119, 160, 231, 289, 298
EBENACEAE, 299-300, 326
Ebony family, 299
Edible fruits, 148, 151, 176, 177, 194, 197, 200-202, 212-215, 218, 232, 258, 260-263, 294, 299, 300, 318
Edible nuts, 87-91, 105, 107, 109, 111-113, 118
Eggleston, W. W., 204
Egg-plant, 314
Elastic wood, 88, 112, 304
"Elbow bush", 317
"Elder", 317
Elm family, 143
"Elms", 143-146
Emetics, 224, 246
EMPETRACEAE, 231, 325
Endogens, 86
Endothia, 109
Engler, A., 29
ERICACEAE, 285-294, 326, 327
Euonymus, 249-250
EUPHORBIACEAE, 228-231, 325
Evergreen decorations, 14, 86
Evolution, (23, 24) (See also Mutation)
Evonymus, 249
Excelsior, 42, 48, 101, 102, 256, 266
Exogens, 86

F

FABACEAE, 220
FAGACEAE, 107
Fagara, 225
Fagus, 107-108, 330
"False bittersweet", 250
"False indigo", 221
Fans (palm-leaf), 78
Faucets, 107
Febrifuges, 101
Felloes, 112, 151
Fences, 41, 54, 62
Fence-palings, 41, 62, 67, 172
Fence-posts (See Posts)
Fence-rails, 41, 68, 87, 108, 122, 166, 182

Fernald, M. L., 107, 204
Fernow, B. E., 15 18 20 43 63
Ferruginous soils (53), 92, 122, 124, 129, (255)
Fevers, 276, 307
Fiber, 42, 72, 78, 79, 266, (339)
"Filberts", 104
Fire, effects of (miscellaneous), 13, 17, 70, 73, 79, 121, 122, 183, 278, 287, 300, 311
Fire, species sensitive to, 54, 58, 60, 63-65, 69, 70, 73, 83, 86, 105, 107, 121, 139, 162, 168, 176-179, 185, 186, 190, 191, 202, 203, 213, 215, 216, 224, 226, 231, 238, 240, 244, 246, 256, 257 259, 260, 263, 265, 266, 274, 275, 278, 289, 293, 295, 298, 300, 301, 306, 307, 309, 313, 315, 318, 321
Fire, species tolerant of, 13, 43, 45, 53, 66, 79, 84, 99, 109, 116, 119, 126, 129, 237, 240, 249, 261
Firmiana, 268
Fish-bait, 316
Fish poison, 256
Fishing poles, 73
Fixtures, 266
Flavoring, leaves used for, 181, 182
Fletcher, W. F., 15, 299
Floats, 282
Flooring, 41, 107, 252, 282
Florida, 42, 45, 60, 79, 100, 103, 119, 121, 135, 176, 217, 223, 230, 231, 261, 291, 292, 327
Flower urns and vases, 62, 66
Fluctuation of water, 25, 62, 66, 67, 101, 103, 106, 115, 146, 166, 253, 280, 282, 283, 306, 317
Fodder or forage, 76, (78, 79, 86, 113), 116, (118), 220, 240, 244, 257, 301
Food plants, 72, 78, 79, 87, 158, 220, 228, 322 (See also Edible)
Foot-logs, 39
Forage (see Fodder)
Forestiera, 306
"Forked-leaf blackjack", 126
Forsteronia, c10
Fossil pine cones, 55
Foster, H. D., 115, 116
Fothergilla, 192
"Fox-berry", 311
Fragrant flowers, 179, 200, 223, 227, 268, 285 286
Fraxinus 21, 154, 156, 304-306
" *Americana*, 156, 157, 304-305, 330
" *Biltmoreana*, 304
" *Caroliniana*, 305, 334
" *lanceolata*, 305
" *Pennsylvanica*, 304
" *platycarpa*, 305
" *quadrangulata*, 305-306
Freezers, 62
"French mulberry", 311
Fried elder flowers, 317
"Fringe-tree", 307
Frost-bite, 192
"Frost grape", 262
Frothingham, E. H., 15, 60
Fuel, wood used for, 41, 42, 52, 58, 88, 102, 105, 106, (108), 113, 115 122, 126, 129, 133, 139, 151, 166, 172, 192, 223, 232, 243, 269, 305
Fungi (in soil), 108
Furniture, 63, 68, 87, 105, 106, 108, 112, 122, 143, 153, 162, 172, 193, 252, 253, 256, 266, 282, 304

G

"Gallberry", 30, 249
Gattinger, A., 237
Gaylussacia, 294, 295, 332, 333, 336, 338
Gelsemine, 309
Gelsemium, 309-310, 335, 336
Geobalanus, 212
Georgia, 16, 47, 60, 109, 119, 153, 157, 172, 203, 220, 225, 243, 271, 288, 291, 292, 300, 315
Gledits.(ch)ia, 19, 154, 157, 218-220
"Globe-flower", 317
Glyptostrobus, 66
Golf sticks, 88
"Gooseberries", 190, 296-297
Gooseberry family, 190
"Gopher-apple", 212
"Gopher-berry", 294
Gordonia, 268-269, 332
Grafting, 201, 213
Graham, J. Y., (169)
GRAMINEAE, 72-77, 325
"Grandsir graybeard", 307
Grant, C. V., 15, 240
"Grapes", 261-263
Grass family, 72
Gravatt, G. F., 110
Graves, A. H., 110
Gray, Asa, 16, 292

"Graybeard", 307
Grazing, 73 (See also Forage)
Greeley, W. B., 16
"Greenbrier", 84
Greene, E. L., 16, 203, 238, 293
Greenhouse frames, 63
Griggs, R. F., 152, (289)
Grossularia, 190
GROSSULARIACEAE, 190-191, 325
"Ground oak," 212
"Groundsel tree", 323
Gum (from trees), 43, 192, 300
"Gum" trees (See Black, Red, Sweet)
Gunpowder, 67, 101
Gun-stocks, 87, 254
Gutters (wooden), 63

H

Hackberry, 148
Halesia, 303-304, 330, 334
Half-tone blocks, 107
Hall, W. L., 16, 43, 50, 63, 67
HAMAMELIDACEAE, 191-193, 325
Hamamelis, 27, 191
Hames, 243
Hammond, Harry, 73, 109
Handles, 88, 104, 107, 171, 244, 304, 305
Hansen, A. A., 15, 240
Harbison, T. G., 16, 61, 106, 158, 160, 185, 186, 191, 192, 105, 211, 224, 248, 251, 253, 270, 271, 286, 288, 319, 320, 322
Hardwoods, 86
"Hard maples", 251-253
Hare, H. A., 16
Harris, J. T., 17, 43
Hatch, C. F., 17, 90
" T. P., 17
Hats (palm-leaf), 78
Hatt, W. K., 15
"Haws", hawthorns, 202
"Hazel-nuts", 104-105
Heart-leaf family, 158
Heath family, 285
Hedges, 60, 68, 104, 151, 216, 218, 306
Heller, A. A., 204
"Hemlock", 15, 17, 21, 60
Hemorrhage, 124
Henkel, Alice, 17, (124-125)
Henna, 274
"Hickories", 17, 88-96
Hicoria alba, 92
" *aquatica*, 91, 334
" *Ashei*, 94
" *Carolinae-septentrionalis*, 14, 94
" *cordiformis*, 91
" *glabra*, 92
" *laciniosa*, 94
" *microcarpa*, 94
" *minima*, 91
" *myristicaeformis*, 19, 90, 339
" *ovalis*, 93-96
" *ovata*, 91-92, 154, 156, 329, 334
" *pallida*, 94
" *Pecan*, 19, (22), 90
"High-bush huckleberry", 298
"High-ground willow oak", 133
Hilgard, E. W., 109
Hill, C. L., 18, 43
HIPPOCASTANACEAE, 255
Hitchcock, A. S., 24
Hodges, R. S., 40, 42, 120
Hodson, E. R., 110
Hoe-handles, 171
"Hog plum", 214
Hogs, 43, 79, 113, 116, 118
"Holly", Holly family, 243
Holroyd, H. B., 18, 282
Honey, 201, 215, 216, 218, 227, 241, 243, 248, 249, 254, 263, 266, 282, 289, 293, 309, 317
"Honey locust", 218
"Honeysuckles", 13, 285, 320
Honeysuckle family, 317
Hoops, 88, 105, 112, 182
Hopkins, A. D., 18, 50, 52
"Hornbeam", 104
Horse-chestnut family, 255
Horse medicine, 307
"Horse-sugar", 301
"Horse-wicky", 292
Houses, 68, 112 (See also Lumber, etc.)
Howell, A. H., (50), 82, 247
Hubs, 218, 279
"Huckleberries", 294-298
Huckleberry family, 294
"Huisache", 217
Humus, 69, 101, 107, 173, 179
"Hurrah bush", 292
Hybrids, 20, 22, 90, 102, 103, 111, 1113, 117, 131 137, 164, 204, 205, 208, 260, 288
Hydrangea arborescens, 21, 185, 330
" *cinerea*, 185, 186, 329
" *quercifolia*, 186-189, 331, 337, 338
" *radiata*, 185, 186
HYPERICACEAE, 270-273, 326

Hypericum aspalathoides, 272, 332
" *aureum*, 271, 329 3,38
" *cistifolium*, 273
" *fasciculatum*, 272, 332
" *galioides*, 272
" *myrtifolium*, 271, 332
" *nudiflorum*, 273
" *opacum*, 273, 332
" *prolificum*, 271
" *sphaerocarpum*, 273
" *turgidum*, 273

I

Ilex ambigua, 247
" *Beadlei*, 248
" *Caroliniana*, 247
" *Cassine*, 244, 246, 332
" *Dahoon*, 244
" *decidua*, 247, 331
" *glabra*, 30, 38, 249, 250, 333, 337
" *longipes*, 247
" *lucida*, 248
" *mollis*, 248
" *monticola*, 248
" *myrtifolia*, 244, 332
" *opaca*, 243-244
" *verticillata*, 248
" *vomitoria*, 20, 246-247, 333
Illicium, 38, 173-176, 334, 337, 338
Illinois, 114
Ill-scented flowers, 173, 226
Indians, 76, 118, 151, 182, 214, 246, 316
"Indian bean", 316
"Indian cherry", 259
"Indian currant", 311, 320
"Indigo", false, 221
Ink, 254
"Inkberry", 30, 249
Inlaying, 244
Insects, 108, 227
Insulator pins, 151, 223
Interior finish, 54, 62, 67, 108, 112, 148, 153, 193, 215, 244, 255, 282, 299, 304
Interlaced grain (wood), 249, 282
Irish potato, 314
Iron in soil, 53 (See also Ferruginous)
Ironing boards, 266
"Ironwood", 104
Itea, 186, 188, 335
Iva, 322, 331
"Ivy", 289; poison, 15, 240

J

Jelly, 201, 202, 215, 262, 296, 317
Jenkins, L. W., 18
"Jessamine", yellow, 309
Johnson, J. B., 21, L. C., 78
Johnstone, G. R., 14
Joists, 41
Jones, W. B., 49, 59, 82, 195, (196), 228, 230, 290
"Judas trees", 217
JUGLANDACEAE, 87-96, 325
Juglans, 22, 87-88, 329, 334
Juglone, 22
"Jujube", 260
"June-berry", 202
"Juniper", 67
Juniperus, 19, 25, 68-72

K

Kalmia, 27, 176, 289-291, 295, 331, 332, 338
Kellogg, R. S., 18, 276
Kindling, 42, (52)
Knees, sypress, 62, 63, 65
Kraunhia, 222

L

LABIATAE, 312-314, 326, 327
Lacquer, 239
Ladders, 88
Lagerstroemia, 275
Lampblack, 43, 67
Lantana, 312
LAURACEAE, 180-184, 325
"Laurel", 173, 180, 289
"Laurel cherry", 216
Laurel family, 180
"Laurel oak", 139
Laurocerasus, 212, 216
"Lavender", 312
Lawn-grass, 72
"Leatherwood", 274
Leavenworth, M. C., 18
LEGUMINOSAE, 216, 220-224, 325
"Leopard oak", 124
Leptocarya, 216
Leucobalanus, 112
Leucothoe, 291-292, 332
Levers, 104, 112
Lightning, 45, 89
Lightwood, 42, 52
"Lilac", 304
LILIACEAE, 82-83, 325
Lily family, 82

"Lin, linden", 299
Linden family, 266
Lindera, 183
Liniments, 191
Liquidambar, 15, 20, 22, 156, 192-193, 335
Liriodendron, 13, 172-173
"Live oak", 119, 121
Lloyd, S. J., 272
"Loblolly", 161
"Loblolly bay", 268
"Loblolly pine", 13, 21, 48
"Locust", 218-220, 223-224
LOGANIACEAE, 309, 326
Log cabins, 41, 172
"Lombardy poplar", 103
Long, W. H., 109
Long Island, (67), 100, 257
"Long-leaf pine, 13, 17, 19, 21, 22, 24, 39-46, 126
Lonicera, 13, 320-321, 329, 337
Loosestrife family, 274
LORANTHACEAE, 154-157, 325
Louisiana, 47, 48, 62, 99
Lumber, 18, 20, 25, 39, (48), 52, 60, 100, 113, (192-193), 212, (251), 256
Lycium, 314, 331
Lyonia (See Pieris)
Lythraceae, 274-275, 326

M

McAtee, W. L., 18, 240
"Macartney rose", 200
Maclura, 151
"Magnolia", 54, 161-163; family, 161
Magnolia, 161-172, 336
" *acuminata*, 171, 330, 335, 337
" *cordata*, 13, 171-172
" *foetida*, 161, 164
" *Fraseri*, 167, 333
" *glauca*, (27), 45, 164-166, 334
" *grandiflora*, (54), 161-165, 333
" *macrophylla*, 168-171, 176, 331, 335, 337, 338
" *pyramidata*, 167, 331' 333, 334, 339
" *tripetala*, 167, 330, 335, 337
" *Umbrella*, 167
" *Virginiana*, 164
MAGNOLIACEAE, 161-176, 325
Mahogany family, 227
MALACEAE, 200
Malus, 200-201, 330
Maple family, 251
"Maples", 18, 251-254
Maple sugar, 251
Marsh, C. D., 18, 223
Marshall, R. P., 110
Maryland, 21, 58
Massachusetts, 61, (100)
Masts, 39
"Mate", 246
"Matrimony vine", 314
Mats, 101, 177
Mattoon, W. R., 18, 43, 47, 52, 63
Mattresses, 79
Mauls, 119, 279
Maxwell, Hu, 16-18, 43, 50, 52, 63, 67, 105 107
"Meadow-sweet", 194
Medicinal plants, 13-21, 60, 78, 79, 83, (88), 91, 97, 99, 101, 104, (106), 107, (109), 124, 145, 154, 158, 166, 167, 173, 177, 179, 182, 183, 186, 191, 192, 197, 212, 217, 218, 225-228, 232, 237, 238, 240, 244, 249, 255, 258, 260, 265, 274-276, 293, 299, 304, 307, 312, 318, 322
Melanobalanus, 112
Melia, 227-228, 250
MELIACEAE, 227-228, 325
Menziesia, 289
Metcalf, H., 110
Mexico, 82, 203, 227
Mezereum family, 274
Michaux, A., 171; F. A., 68, 301
Michigan, 60
Milky juice, 151, 228, 310
Miller, E. R., 14
Mill-work, 172, 266
"Mimosa", 217
MIMOSACEAE, 217, 325
Mine props, 41
Mint family, 312
Mississippi, 43, 47, 76, 100, 109, 119, 161, 163, 177, 183, 192, 193, 220, 266
Missouri, 237
"Mistletoe", 154, 155
"Mock orange", (151), 184, 216
Mohr, Charles, 9-12, 19-21, 29-31, 43, 47, 50-54, 60, 61, 69, 74, 76, 82-91, 94, 97-106, 115, 116, 119, 121, 131-137, 146-152, 157-161, 167-172, 176, 179, 180, 183-185, 188-192, 195-202, 206, 209-216, 222-231, 235, 239, 243, 244, 247-267, 270-275, 279, 286-288, 292-306, 310-323

Mohrodendron, 303
Moldings, 266
"Moosewood", 274
MORACEAE, 151-152, 325
Morella, 97
Morus, 152, 330, 335
Moths, 68
"Mountain laurel", 289
"Mountain oak", 116
Mouse-traps, 107
Mucilaginous bark, 145
"Mulberry", 151, 152
Mulching, 41
"Muscadines", 261, 263
Muscadinia, 261
Musical instruments, 87, 282
Mutations, 208
Myrica Carolinensis, 98-100, 334, 336, 337
" *cerifera*, 97-99, 333
" *inodora*, 98, 100, 332
" *pumila*, 98, 99
MYRICACEAE, 97-100, 325
"Myrtles", 97-100

N

"Narrow-leaved blackjack", 133
Nash, G. V., 178
Naval stores, 39, 43
"Needle palm", 81
Negroes, 52, 183, 227, 228
Negundo, 254
Neillia, 194
Nellis, J. C., 20, 110
NEPETACEAE, 312
Nesaea (See *Decodon*)
Nestronia, 157, 336
Neuralgia, 99
Nevius, R. D., 16, 195
Neviusia, 16, 19, 20, 194-196, 329, 338
"New Jersey tea", 260
New York, 60, 67, 109, 110, 131, 226, 278
"Nigger pine", 58
Nightshade family, 314
"Nine-bark", 194
Nitrogen (in soil), 101, 216
North Carolina, 20, 106, 109, 157, 172, 246, 322
Northern books, 29-30, (122, 125), 227, 249
"Northern pawpaw", 177
"Northern prickly ash", 225, 275
"Northern red oak", 124
Novelties (wooden), 266
"Nutmeg hickory", 90
Nyssa aquatica, 232
" *biflora*, 156, 157, 280-281, 334, 336
" *multiflora*, 279
" *sylvatica*, 154, 156, 157, 279-280
" *uniflora*, 18, 62, 157, 282-284, 331, 334, 339

O

Oak family, 107-142
"Oaks", 14, 16, 25, 111-142
Oars, 304
"October flower", 159
Odorous wood, 68
Officinal drugs, 79, (113), 134, (145), 182, 191, 215, 225, 238, 309
"Ohio buckeye", 255
"Old field pine", 48
Olea Americana, 307
OLEACEAE, 304-309, 326
Olive family, 304
Oils, vegetable, 43, 68, 78, 87, 106, 107, 231
Oklahoma, 151, 237
"Opopanax", 217
Opulaster, 194
Ornamental plants, 39, 52, 54, 58, 60, (61), (66), 67, 68, 72, 73, 78, 82, 83, 92, 97, 100, 103-108, (112), 114, 151, 152, 158, 164, 167, 168, 171, (172), 176, 178, 184-186, 188, 190-192, 194, (195), 198-202, 209, 210, 212, 213, 215-218, 220, 222-225, 227, 228, 231, 238, 243, 246, 247, 250, 251, 254-262, 264, 265, 268, 269, 271, 274-276, 279, 285, 286, 288, 289, 292, 293, 296, 297, 301-304, 307, 309-312, 314-323
"Osage orange", 151
Osmanthus, 38, 307-309, 334-338
Ostrya, 104, 330
"Overcup oak", 114
Owen, Thos. M., 17, 19
Oxydendrum, 293, 338
Ox-yokes, 105, 153, 279, 255

P

Padus, 212, (214-216), 339
Palings, 41, 62, 67, 172
PALMAE, 78-82, 325
Palmer, E. J., 20, 205
Palm family, 78

"Palo verde", 220
"Papaw, papaya", 177
Paper, 22, 58, 60, 79, 102, 151, (172), 255
"Paper mulberry", 151
Papyrius, 151, 156 (226)
Paraguay tea, 246
Parasites, 154
Parkinsonia, 220
"Parsley haw", 210
Parthenocissus, 265
Patent medicines, 79, 307
Paterson, J. H., 114
Paulownia, 314
Paving blocks, 18, 41
"Pawpaw", 177-178
Pea family, 220
Pea-vine supports, 182
"Pecan", 22, 88-90
Pellagra, 179
Pencil wood, 22, 68
Pennell, F. W., 313
"Pepperidge", 279
Perfume, 312, 313
Persea, 180-181, 333, 334, 337
"Persimmon", 15, 299
Peters, T. M., 9, 20, 61, 158
Philadelphus, 184, 330
Phoradendron, 154-157, 335
Phosphatic soils, 119, 133
Physocarpus, 194
Piano keys, 266
Pickles (butternut), 88
Picture frames, 266
Pieris, 292, 332, 334, 338
Piles (wooden), 39, 62, 68
"Pillenterry", 225
"Pin oak", 115
PINACEAE, 39-72
Pinchot, Gifford, 20
"Pines", 13-16, 18-20, 24, 39-60
Pine straw, 41
Pine wool, 42
Pinus australis, 18, 39
" *Caribaea*, 18, 47
" *clausa*, 19, 60, 70, 331
" *Cubensis*, 46
" *echinata*, 18, 52-54, 330
" *Elliottii*, 18, 46-48, 332
" *glabra*, 19, 54-57, 333
" *inops*, 58
" *lutea*, 39
" *mitis*, 52
" *palustris*, (13), 17, 18, 38-46, 166, 334, 336
" *serotina*, 20, 51-52, 333, 337
Pinus Taeda, 13, 21, 48-51, 99, 315
" *Virginiana*, 21, 57-60, 70, 329
"Pipe vine", 158
Pitchforks, 305
Planera, 146, 306, 334
Planes, 107
Plane-tree family, 152
Plaster hair, 79
PLATANACEAE, 152-154, 325
Platanus, 153-154, 156, 331
Plum family, 212
"Plums", 22, 212-214
POACEAE, 72
Pocosin of Pike Co., 17, 134-136, 140, 180, 216, 300
"Poison dogwood, elder, or sumac", 15, 18, 239
"Poison ivy", 15, 240
"Poison oak", 240
Poisonous plants, 14, 15, 18, (179, 182), 215, 216, 220, 223, 228, 231, 232, 239-241, 256, 289, 291, 309, 310, 314
Poles, 39, 48, 62, 65, 67, 68, 108, 182-183, 223
Pollard, C. L., 20, 195
Polycodium, 296-297, 329, 330, 338
POLYGONACEAE, 158-160, 325, 327
Polygonella, 159-160, 325, 327
POMACEAE, 200-211, 325
"Pond cypress", 25, 65, 272
"Pond pine", 51
"Pop-ash", 305
Pop-guns, 73, 227, 317
"Poplars", 13, 102, 103, 172
Populus, 22, 102-103, 156, 157, 330, 335
Porch columns, (39), 161, 171, 282
Porcher, F. P., 20, 79, 260
"Possumwood", 303
"Post oaks", 113-115
Posts, 25, 27, 41, 67, 68, 87, 104, 108, 113, 145, 151, 152, 182, 218, 223, 232
Potash, potassic soils, 53, 87, 101, 115, 118, 257
Poultices, 122, 238
Power, F. B., 20, 246
Pragmatism, 25
"Prairie plum", 213
Prantl, K., 29
Prentiss, A. N., 21, 60
Preserves, 201, 213, 214, 317
"Prickly ash", 225, 275
"Pride of India", 227
Primos, 248-249
Privet brakes, 229

Prunus, 22, 212-216, 338, 339
" *Alabamensis*, 20, 216, 328
" *Americana*, 213, 330, 335
" *angustifolia*, 156, 214
" *australis*, 14, 215
" *Caroliniana*, 156, 216, 334
" *Chicasa*, 214
" *Cuthbertii*, 216
" *hortulana*, 213
" *injucunda*, 214
" *lanata*, 213
" *mitis*, 14, 214
" *pumila*, 339
" *serotina*, 214-216, 339
" *umbellata*, 214
Prussic acid, 215
Ptelea, 225, 226, 251, 330
Pulmonary complaints, (39), 109, 215
Pulp (for paper), 22, 58, 60, 172, 255
Pulse family, 220
Pumps, pump logs, 58, 161, 171, 172, 282
"Pussy-willows", 102
Pyrularia, 157
Pyrus, 200, 201
Pyrophobic plants, 246
(See Fire)

Q

Quassia family, 226
Quercitron bark, 124
Quercus 21, 111-142
" *acuminata*, 118
" *alba*, 112-113, 117, 335
" *aquatica*, 137
" *Arkansana*, 17, 20, 133-137
" *austrina*, 116
" *Bernardiensis*, 22, 117
" *borealis*, 124, 330
" *Boyntoni*, 14, 113
" *brevifolia*, 133
" *breviloba*, 115
" *Caput-rivuli*, 133, 135
" *Castanea*, 118
" *Catesbaei*, 126-129, 133, 333
" *cinerea*, 132-133, 134
" *coccinea*, 125-126, 330, 337
" *digitata*, 122
" *Durandii*, 14, 19, 115, 116, 329, 339
" *falcata*, 122, 124, 125, 335
" *ferruginea*, 129
" *geminata*, 121, 332
" *heterophylla*, 19, 131
" *laurifolia*, 16, 139-141, 156, 334
Quercus lyrata, 114-115, 330, 334
" *macrocarpa*, 114
" *Margaretta*, 113, 114, 333
" *Marylandica*, 129-131, 156
" *Michauxii*, 118-119, 334, 335
" *minima*, 121, 332
" *minor*, 113
" *montana*, 22, 113, 116-117, 329
" *Muhlenbergii*, 118
" *myrtifolia*, 137, 139
" *nigra*, 129, 137, 155-156, 335
" *Nuttallii*, 131
" *obtusa*, 128, 156
" *obtusiloba*, 113
" *Pagoda* (*pagodaefolia*), 122, 329
" *Phellos*, 16, 137, 140, 154, 156, 330, 335
" *prinoides*, 118
" *Prinus*, 116, 118
" *rhombica*, 138
" *rubra*, 122, 124
" *Saulei*, 117
" *Schneckii*, 125, 126, 156
" *Shumardii*, 125
" *stellata*, 22, 113, 117
" *Texana*, 125, 131
" *tinctoria*, 124
" *triloba*, 122
" *velutina*, 123-125, 329
" *virens*, 119, 121
" *Virginiana*, 119-121
Quinine, 317

R

Rafters, 41
Ragweed family, 322
Rainfall, 36-38, 47, 332
RANUNCULACEAE, 178-179, 325, 327
Rapid growth, 151, 226, 227
"Raspberry", 198
"Rattan vine", 259
"Red bay", 180, 181, 268
Rattlesnakes, 306
"Redbud", 217, 254
"Red cedar", 16, 20, 22, 68
"Red cypress", 61
"Red elm", 143
"Red gum", 15, 22, 192 (See also Sweet gum)
"Red haws", 202
"Red maple", 254
"Red mulberry", 152
"Red oak", 25, 122, 124, 125
Red pepper, 314
"Red-root, red-shank", 260
"Red sumac", 238

"Reeds", 72
Rehder, Alfred, 21, 22, 107, 285-287
RHAMNACEAE, 258-261, 326
Rhamnus, 259, 335
Rhapidophyllum, 80-82
Rhododendron, 22, 285, 287-289, 329, 336
Rhus, 16, 18, 232-240
" *aromatica*, 238
" *atrovirens*, 238
" *copallina*, 237
" *cotinoides*, 14, 19, 232
" *glabra*, 238, 330
" *radicans*, 240
" *Toxicodendron*, 240
" *typhina*, 238
" *venenata*, 239
" *Vernix*, 239
Ribes, 190, 191, 328
Richardson, W. D., 339
"River cypress", 25, 61
"River grape", 263
Road material (pine straw), 41
Robinia, 223-224, 329
Robinson, B. L., 204
Rogers, Miss Z., 257
Rollers, 119, 279
Ropes (bark), 177, 266
Rosa, 198-200
ROSACEAE, 194-200, 325
Rose family, 194
"Rosemary", 231, 313
"Roses", 198-200, 208
Rosin, 41, 43
Roth, Filibert, 20, 21
"Round-leaf black-jack", 129
Rubber, 151, 229
RUBIACEAE, 317, 326
Rubus, 197-198, 329
Rue, J. D., 22, 58, 60
Rugel, Ferdinand, 273
Rulac, 254
Rumbold, Miss C., 109
Rusby, H. H., 16

S

Sabal, 78, 80, 333
Sabina, 68, 70
Sageretia, 29, 259, 331
"St. Andrew's cross", 270
St. John, Harold, 21, 185
St. Johnswort family, 270
"St. Peter's wort", 270
SALICACEAE, 100-103, 325
Salicylic acid, 101
Salix, 101, 102, 329, 335, 337
Salt (in soil), 119, 314, 322, 323, 331
Salves, 191
Sambucus, 317, 335
Sandals, 314
Sandalwood family, 157
Sand-bars, 101
"Sand-hill post oak", 114
SANTALACEAE, 157, 325
SAPINDACEAE, 250, 326
Sapindus, 227, 250
Sapium, 231
Sapodilla family, 300
SAPOTACEAE, 300-301, 326
Sargent, C. S., 21, 26, 60, 102, 109, 116, 118, 120-122, 125, 167, 191, 203-205, 207-209, 211, 235, 237, 243, 266-268, 300, 301, 304
"Sarsaparilla", 176, 275
Sash (for windows), 41, 63
"Sassafras", 27, 181-183, 300
Satureja, 312
Sawdust, 41
Saw-handles, 107
Sawmills, 45, 46
"Saw-palmetto", 79
SAXIFRAGACEAE, 184-190, 325
"Scaly-bark hickory", 91, 94
"Scarlet oak", 125
Schaeffer, C. H., 304
Schizandra, 176
Schmaltzia, 238-239, 329, 338
Schwarz, G. F., 21, 43
Scientific instruments, 215
Scroll-work, 244
SCROPHULARIACEAE, 314, 326
"Scrub live oak", 121
"Scrub pine", 21
Scuppernong, 263
Sebastiana, 230-231, 334
Sedatives, 215
Senna family, 217
Serenoa, 79, 80, 332
Sensitive plants, 217
"Service-berry", 202
Sesbania Cavanillesii, 223
"Seven-bark", 186
Sewing machines, 87
Shackelford, R. W., 131
"Shad-bush", 202
Shade trees, (61, 66, 68), 87, 102, 103, 107, 108, (112), 114, 116, 119, 122, 125, 131, 137-140, 143-146, 148, 151-153, 171, (172), (192), 223, 225-227, 251, 253, 254, 266, 304
Shafer, J. A., 204
Shingles, 41, 62, 67, 108, 172, 183

Ships, 112, 143
Ship knees, 119
"Shittimwood", 232
Shoe findings, lasts, 107, 299
"Short-leaf pine", 18, 25, 48, 52
Shuttles, 243, 276, 278, 293, 299
Silica (in *Prunus*), 213, 339
Sills, 41
"Silver bell tree", 303
'Silver maple", 253
SIMARUBACEAE, 226, 325
Slack cooperage, (41), 193
"Slippery elm", 143
"Slash pine", 18, 24, 46-48
"Sloe", 214
Small, J. K., 26, 29, 30, 157, 179, 192, 198, 204, 206, 226, 227, 264, 285, 288, 289
SMILACACEAE, 83-86, 325
Smilax, 83-86, 327
" *auriculata*, 84, 331
" *Beyrichii*, 84
" *glauca*, 84
" *lanceolata*, 85-86, 333
" *laurifolia*, 85, 336, 337
" *rotundifolia*, 84
" *Walteri*, 85, 333, 337
Smith, Eugene A., 9, 10, 20, 21, 32, 34-38, 40, 42, 105, 115, 120, 167, 178, 199, 229, 236, 244, 259, 265, 269, 270, 288, 310, 313
" Franklin H., 18
" S. P., 21
"Smoke-trees", 232
Smoking meat, 88
Snake-bites, 307
Snow, effect on vegetation, 28
Snow, C. H., 21
Soap, 97
"Soapberry", 250
"Soft maples", 253-254
Soil fertility, 32, 34, 38, 160, 271
SOLANACEAE, 314, 326, 327
Sore mouth, 179
Sour soil, 332
"Sourwood", 293
South Carolina, 47, 73, 79, 109
"Spanish bayonet", 82
"Spanish oak", 122, 125
"Sparkleberry", 295
Spars, 39
"Spice-bush, spice-wood", 183
Spigots, (107)
"Spikenard", 275
Spiraea, 194
Splitters (of species), (24-25), 70, 200, 208, (266, 167)
Spokes, 88
Spools, 115, 193
"Spoon-wood", 289
"Spruce pine", 19, 54, 58, 60
Spurge family, 228
"Squaw huckleberry", 296
Squirrels, 146
Staff-tree family, 249
Standish, L. M., 208
Staphylea, 226, 251, 335
STAPHYLEACEAE, 251, 326
State flower, 199, 339
Staves, 41, 112, 113, 122 (See also Cooperage)
Stelle, J. P., 21, 243, 260, 269
Sterculia, 268
STERCULIACEAE, 268, 326
Sterrett, W. D., 21, 50, 58, 304
Stewartia, 269-270, 328, 336
Stillingia, 229, 332
Stimulants, 166, 173, 225, 246
"Stink-bush, stinking bay or laurel", 173
Storax family, 302
"Strawberry bush", 249
Strong-scented plants, (232), 237, (238, 316)
Strychnine, 309
Stuartia, 269
STYRACACEAE, 302-304, 326
Styrax, 302-303, 332, 334, 336, 338, 339
Sudworth, G. B., 22, 26, 29, 68, 131, 203, 205, 207, 267
Sugar, 251
"Sugar-berry", 148
"Sugar haw", 209
"Sugar maple", 251, 252
Sulphur (in soil), 119, 243
Sumac family, 232
"Sumacs", 15, 18, 237-239
Sunflower family, 322
Surgery, 282
Surface, H. E., 22, 43
"Swamp chestnut oak", 118
"Swamp hickory", 91
"Swamp palmetto", 78
"Swamp post oak", 114
"Sweet bay", 164, 180, 301
"Sweet gum", 55, 108, 192
"Sweet leaf", 301
"Sweet pepper bush", 285
"Sweet-shrubs", 179
"Sweet sumac", 238

"Sycamore", 14, 153
Symphoricarpos, 320, 329
SYMPLOCACEAE, *Symplocos*, 301-302, 326, 338
"Syringa", 184

T

Tallow, "tallow tree", 231
Tamala, 180
Tan-bark, 60, 107, 116
"Tan bay", 268
Tanks, 62
Tannin, 79
Tanning, (60), 107, 109, 113, 116, 119, 122, 237, 269
Tar, 43
Taxodium, 16, 18, 21, (25), 61-67 (See also Cypress)
" *ascendens*, 64-67, (292), 332
" *distichum*, 61-65, 78, 146-148, 333
" *imbricarium*, 64, 65, 292, (332)
Tea, 246, 260, 268
Tea family, 268
Tecoma, 315, 335
Telegraph and telephone poles (see Poles)
Tennessee, 13, 68, 172, 237, 322, 336
TERNSTROEMIACEAE, 268
Texas, 90, 99, 131, 151, 217, 223, 237, 327
THEACEAE, 268-270, 326
Thistle family, 322
"Thunderwood", 239
THYMELEACEAE, 274, 326
"Tighteye", 241
Tilia, 14, 21, 25, 268, 326
TILIACEAE, 266-268, 326
"Titi", 241
Tomatoes, 314
Tonics, 166, 173, 215, 224, 226, 276, 307
Tool-handles, 104
Toothache, 99
"Toothache tree", 225
Torches, 42
Tough bark, 266, 274
Toxicodendrol, 240
Toxicodendron, 239-241, 336, 337
Toxylon, 151, 156
Trachelospermum, 310, 334
Tramways, 282
"Tree huckleberry", 295
"Tree of Heaven", 226
Trestles, 58, 63, 68
Troughs, 62
True, R. H., 22, 90
Trumpet-creeper family, 315
Trunks, 256
Tsuga, 15, 60-61
Tsutsusi, 286, 339
Tubs, 62
"Tulip (poplar) tree", 172
Tulipastrum, 171
Tuomey, M., 167, 216, 231
"Tupelo (gum)", 18, 279, 282
"Turkey oak", 126, 133
Turpentine, 19, 24, (39), 42, 43, 45, 46, 48
'Tyty", 241, 243

U

ULMACEAE, 143-150, 325
Ulmus alata, 143-145, 156, 330, 335
" *Americana*, 143, 154, 156, 330, 335
" *Floridana*, 143
" *fulva*, 145, 329
" *pubescens*, 145
" *serotina*, 14, 146, 329, 339
"Umbrella tree", 227
Underwood, L. M., 184, 286, 293
U. S. Dept. Agriculture, 9, 14, 15, 17, 18, 20-22, 90, 110
U. S. Forest Service (formerly Division or Bureau of Forestry), 12, 14-18, 21, 22, 87, 112, 113, 148, 173, 215
U. S. National Herbarium, 9, 20
U. S. Pharmacopoeia, 79, 113, 182, 238, 309
Uphof, J. C. T., 195

V

Vachellia, 217
VACCINIACEAE, 294-299, 326
Vaccinium arboreum, 295
" *corymbosum*, 198, 336, 338
" *Elliottii*, 298
" *fuscatum*, 299
" *Myrsinites*, 297, 334, 338
" *nitidum*, 297
" *pallidum*, 299
" *stamineum*, 20, 296
" *vacillans*, 298, 330, 336
" *virgatum*, 336, 338
Vandals, 269, 277, 287, 288
"Varnish tree", 268
Vases, Vats, 62
Veatch, J. O., 135
Vehicles, 112, 143, (172)
Veneers, 153, 162, 193, 282, 314
VERBENACEAE, 311-312, 326
Vervain family, 311

Viburnum acerifolium, 318, 330, 337, 338
" *bracteatum*, 319
" *cassinoides*, 320, 329, 337
" *dentatum*, 320
" *ferrugineum*, 318
" *Lentago*, 320
" *molle*, 319
" *nitidum*, 320, 332
" *nudum*, 319, 320, 338
" *obovatum*, 320
" *prunifolium*, 318
" *rufidulum* (*rufotomentosum*), 318
" (*scabrellum*), *semitomentosum*, 319, 333, 338, 339
Vines, 29, 324-326
Virginia, 21, 58, 76, 227, 246
"Virginia creeper", 265
Vitex, 312
VITACEAE, 261-265, 326, 327
Vitis aestivalis, 262
" *Baileyana*, 264
" *bicolor*, 262
" *bijimnata*, 264
" *cinerea*, 262
" *cordata*, 262-263
" *incisa*, 264
" *indivisa*, 264
" *riparia*, 263
" *rotundifolia*, 263, 335, 336
" *vulpina*, 263
Von Schrenk, H., 22, 193

W

Wagons, 172 (See also Vehicles)
Wagon standards, 112
"Wahoo", 143
Wailes, B. L. C., 109, 183, 192, 193, 266
Wainscoting, 41
"Walnut", 14, 22, 87-88, 145
Walnut family, 87-96
Wash tubs, 62
Water buckets, 67
"Water elm", 146
"Water oak", 25, 137-139
Water pipes (wooden), 58, 62
Watson, Sereno, 199, 203
Wax, 97-100
"Wax myrtles", 97-100
"Waxwork", 250
Weatherboards, 41, 54, 172
Wedges, 104
Weedy plants, 50, 83, 84, 103, 137, 139, 145, 150, 154, 158, (159), 181-182, 193, 197-199, 203, 214, 215, 217, 218, 220, 223, 224, 226, 228, (237, 238, 246), 250, 260, 264-266, 268, 275, 299, 310, 312, 314-317, 320, 321, 323
Wells, S. D., 22, 58, 60
Wheelbarrows, 107
Wheeler, A. S., 22, 87
" H. E., 194, 221
Whips, 88
White, L. L., 22, 69
"White alder", 285
"White ash", 304, 307
"White bay", 27, 164
"White cedar", 67
"White cypress", 61
"White elm", 143
"White maple", 253
"White mulberry", 152
"White oak", 16, 112
"White poplar", 172
"White sumac", 238
"White walnut", 88
"Whitewood", 172
Whooping cough, 109
"Wicky", 291, 292
"Wicopy", 274
Wight, W. F., 22, 212-214
"Wild cherry", 214
"Wild china", 227, 250
"Wild grape", 227, 250
"Wild peach", 216
"Wild plum", 213, 214
"Wild sarsaparilla", 176
"Wild smilax", 85
Williamson, A. W., 22, 103
"Willow", 27, 101, 102
Willow family, 100
"Willow oak", 139-142
Wilson, E. H., 22, 285, 286
" M. C., 9, 192, 194, 220, 251, 271, 288
"Winged elm", 143
"Winter huckleberry", 295
Wistaria, Wisteria, 222-223, 334
Wolf, W. (Brother Wolfgang), 22, 117, 129, 150, 157, 167, 192, 199, 211, 213, 222, 224, 247, 248, 253, 269, 286, 287, 322

"Woodbines", 320
Wood-burning locomotives, 42
Woodenware, 148, 171, 244, 253, 255, 266, 304
Wood pulp, 22, 60, 172, 255, 258
Woodruff, S., 305
Wreaths, 180, 243
Wyman, W. S., 16, 195

X

Xanthorrhiza, 178, 330, 336, 337
Xanthoxylum, 225
Xolisma, 293 (See *Cholisma*)

Y

"Yaupon", 244, 246
"Yellow cypress", 61
"Yellow jessamine", 309
"Yellow oak", 118
"Yellow poplar", 172
"Yellow-root", 178
"Yellow-wood", 220, 232
Yucca, 28, 82-83, 339

Z

Zanthorhiza, 178 (See *Xanthorrhiza*)
Zanthoxylum (See *Xanthoxylum*)
Zizyphus, 260

New York Botanical Garden Library
QK 150 .H295 pt.1 gen
Harper, Roland Macm/Economic botany of A
3 5185 00130 1538